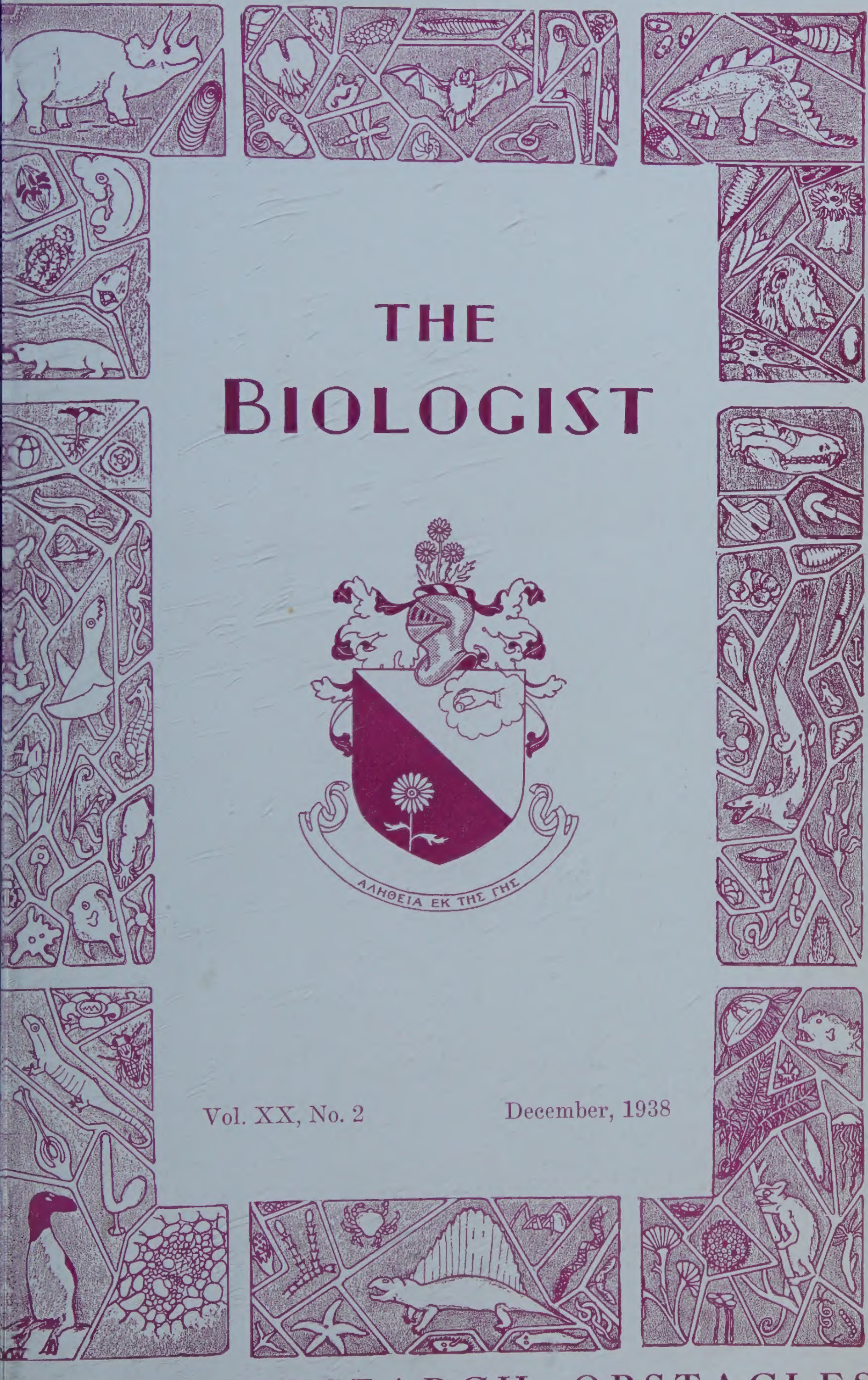
CHAPTER NEWS NUMBER



THE BIOLOGIST

ΑΛΗΘΕΙΑ ΕΚ ΤΗΣ ΓΗΣ

Vol. XX, No. 2 December, 1938

HATCH: RESEARCH OBSTACLES

PHI SIGMA
BIOLOGICAL HONOR SOCIETY

"The object of Phi Sigma is to promote interest in biological research. Although originally designated as an honorary biological research society, it should now be considered as a working guild of biologists interested in research. In effect, election to Phi Sigma should be an opportunity for better work, rather than merely election to an honorary society."

Mile Posts:

1915	March 17, Alpha Chapter organized, Ohio State University.
1916	May, Central Governing Body organized, BIOLOGIST first issued.
1917	June, last War-time BIOLOGIST issued.
1921	February, BIOLOGIST revived.
1924	December, First National Convention, Constitution revised, Washington, D. C.
1925	December, Second National Convention, First Scientific Program, Kansas City.
1926	December, Third National Convention, Second Science Program, Philadelphia.
1927	December, Third Science Program, Nashville.
1928	December, Fourth National Convention, Coat-of-Arms adopted, Fourth Science Program, New York.
1930	January, Council Meeting, Ritual Revised, Norman, Okla.
	December, Fifth National Convention, Fifth Science Program, Cleveland.
1931	Phi Sigma Letters Registered, U. S. Patent Office.
1932	December, Sixth Science Program, Atlantic City.
1933	June, Sixth National Convention, Seventh Science Program, Chicago.
1935	December, Seventh National Convention, Eighth Science Program, St. Louis.
1937	December, Eighth National Convention, Ninth Science Program, Indianapolis.

Expansion:

The Constitution provides that: "An active chapter may be established in any institution of learning which requires for graduation the equivalent of four years of collegiate work, and which is equipped with facilities for research work. - - - - Any petitioning group must be active for at least one year before it may be granted a charter."

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DIRECTORY

OF ALL ACTIVE AND INACTIVE CHAPTERS

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ALPHA

Ohio State University, Columbus, Ohio, founded March 17, 1915, (Inactive).

BETA

University of Michigan, Ann Arbor, Michigan, founded June 3, 1916.

DELTA

University of Maine, Orono, Maine, founded January 27, 1917.

EPSILON

University of Denver, Denver, Colorado, founded March 5, 1917.

ZETA

University of Wisconsin, Madison, Wisconsin, founded May 30, 1917.

ETA

University of Akron, Akron, Ohio, founded April 20, 1921.

THETA

Michigan State College, East Lansing, Michigan, founded April 9, 1921.

IOTA

Washington University, St. Louis, Missouri, founded May 28, 1921.

KAPPA

University of Kansas, Lawrence. Kansas. founded May 31, 1921.

LAMBDA

University of Montana, Missoula. Montana. founded May 4, 1921.

MU

University of California, Berkeley, California. founded April 27, 1922.

NU

Washington and Jefferson College, Washington, Pennsylvania, founded May 11, 1922.

XI

University of Nebraska, Lincoln, Nebraska, founded May 3, 1934.

OMICRON

University of North Dakota, Grand Forks, North Dakota,
founded May 26, 1924, (Inactive).

PI

Emory University, Georgia, founded January 3, 1925.

RHO

University of Illinois, Urbana, Illinois, founded March 28, 1925.

SIGMA

University of Florida, Gainesville, Florida, founded December 4, 1925.

TAU

Duke University, Durham, North Carolina, founded March 4, 1926.

UPSILON

Miami University, Oxford, Ohio, founded May 7, 1926.

PHI

University of New Hampshire, Durham, New Hampshire, founded May 21, 1926.

CHI

Montana State College, Bozeman, Montana, founded February 11, 1927.

PSI

University of Washington, Seattle, Washington, founded April 7, 1928.

OMEGA

University of Oklahoma, Norman, Oklahoma, founded March 24, 1928.

ALPHA ALPHA

University of Southern California, Los Angeles, California, founded May 17, 1930.

ALPHA BETA

Mount Union College, Alliance, Ohio, founded May 17, 1928.

ALPHA GAMMA

University of South Dakota, Vermillion, South Dakota, founded May 15, 1928, (Inactive)

ALPHA DELTA

Lawrence College, Appleton, Wisconsin, founded March 7, 1929.

ALPHA EPSILON

University of Pittsburgh, Pittsburgh, Pennsylvania, founded March 23, 1929.

ALPHA ZETA

College of William and Mary, Williamsburg, Virginia, founded April 19, 1930.

ALPHA ETA

Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma, founded March 13, 1930.

ALPHA THETA

State College of Washington, Pullman, Washington, founded May, 1930.

ALPHA IOTA

Bucknell University, Lewisburg, Pennsylvania, founded January 9, 1932.

ALPHA KAPPA

Hunter College, New York City, founded January 8, 1932.

ALPHA LAMBDA

University of Utah, Salt Lake City, Utah, founded February 13, 1932.

ALPHA MU

University and State Agricultural College of Oregon, Eugene-Corvallis, Oregon, founded November 18, 1933.

ALPHA NU

University of New Mexico, Albuquerque, New Mexico, founded April 21, 1935.

ALPHA XI

Rhode Island State College, Kingston, Rhode Island, founded May 17, 1935.

ALPHA OMICRON

Marquette University, Milwaukee, Wisconsin, founded June 18, 1938

OBSTACLES TO RESEARCH

MELVILLE H. HATCH*

THE person who has determined that he is sufficiently interested in science to devote a portion of his life to its study and advancement has taken an important step. He has decided that life for him means something more than eating, sleeping, and reproduction, that he is going to participate in the great human adventure of attempting to understand the world. It is an undertaking of unique solemnity and moment in which he has determined to join, a task that taxes the highest standards of mind and character that any person can bring to it.

It may, accordingly, be of some help in stimulating our own efforts or in making us more charitable of the limited achievements of ourselves and of our colleagues to review some of the obstacles which persons interested in research encounter or are likely to encounter in the course of its prosecution. I shall begin by taking up what appear to be the less serious obstacles—those that come from the environment rather than from within the personality itself.

First, each one of us must meet the primary demands of food, clothing, shelter—economic security and its natural corollary, the normal enjoyment of our social and reproductive instincts. These are at the basis of all human activity and achievement, and scientific research is no exception. In fact it can be shown that in those areas in which the greatest percentage of the population is engaged in manufacturing,† that is, where there is the greatest amount of surplus wealth and collective leisure due to the most efficient employment of human labor—in central Europe and northeastern United States—there scientific work of all kinds is at its highest level.

Economic security, then, is a primary obstacle. Those who are looking for jobs are, I imagine, rather acutely aware of this. And yet, fortunately, there are jobs to look for. Scientific work originally could be pursued only by persons of wealth and leisure. Such conditions prevailed in this country up to the middle of the last century. The student of the biographies of our early naturalists like Alexander Wilson, John James Audubon, Thomas Say and many others* must be impressed by the difficulties faced by these pioneers in making a bare living. They were unsuited by temperament for business. Audubon went bankrupt and Say neglected his business most scandalously. Wilson tried primary school teaching and died in a garret!

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*(Given at the Spring Initiation of the Psi Chapter of the Phi Sigma Society, June 2, 1938).

†See map, p. 345 in Huntington and Cushing, *Principles of Human Geography* 2nd ed., 1922.

*Cf. S. W. Geiser's recent charming book, *Naturalists of the Frontier* 1927.

Then came the development of science instruction in the schools and the growth of the governmental scientific bureaus and the public and semi-public museums, so that now the boy who likes to collect plants or butterflies has something to which to look forward. A few amateurs continue. Those of us concerned with the cultural aspect of scientific studies believe that their number should increase; but at present in this country most of our amateurs who have so desired have been able to find openings in professional scientific work.

All this does not help much if one is looking for a job and doesn't find it. My only suggestion is to take what one can and prepare for better days. And a research program, properly conceived and controlled, can help in this. Even a very modest course of individual study will give one a sense of continuity that is attainable in no other way. One's house may be just as shabby this year as last, one's job may be no better—in fact, in these days of ''depressions'' and ''recessions'' it is more likely to be worse. But if there are just a few more specimens in the collection, if one's knowledge on certain points is just a little more adequate, life is not entirely meaningless.

I can illustrate from my own experience as a graduate student. I had decided to study beetles, so that I prepared to put myself in a position to prosecute this study by myself regardless of the sort of a position I might obtain. I built up a personal collection, I purchased as many as possible of the books and papers that actual use had shown me were the ones I needed. I invested $75 in a binocular microscope. And during my first year at a college in Illinois, this enabled me to continue my studies in a way that would otherwise have been impossible.

Of course, if one's happiness is tied to a field which involves extensive laboratory equipment, about all one can do is to keep abreast of the literature and wait. Perhaps laboratory facilities will be available for a few weeks in the summer. Perhaps the coveted opportunity to work in a well equipped laboratory will some day knock at the door. But—don't wait too long. Master your environment rather than allow it to master you! Find something, however small, and do it. Better do a little than nothing.

This matter of economic security should not be discussed without pointing out that too much is likely to prove as formidable an obstacle to research as too little. The feeling of complete security, plus the business and social responsibilities that accompany wealth, are likely to be a deterrent to important achievement. Examples to the contrary are not, however, lacking. I cite the case of the late Lord Rothschild of England who worked on birds, butterflies, and fleas and amassed in each, one of the world's finest collections. The mean condition is probably most conducive to continued scientific work: not so little that one is in want, not so much that one comes to feel himself detached from everyday affairs.

There is another aspect to this question of economic security. The researcher has been eking along on next to nothing as a graduate student or for years he has been a college professor: underpaid, at least in the opinion of his wife, with a heavy teaching load, without too much time for research, and without all of the equipment that he could desire. Then comes the great opportunity: the big research institute calls—visions of a lifetime come true, higher salary, full time for research, all the assistants and books and equipment that are needed. But let our imaginary hero take pause to think in this exciting crisis, let him inspect the other side of the picture,—for there is another side, I can assure you. Let him determine to what extent he will become just a cog in a machine. Surely, he will have all his time for research—but will it be his own or someone else's problems that he will be studying? Does he not stand to lose that most essential feature of academic freedom, the privilege of directing his studies as and where the spirit moves. Perhaps not, perhaps the new position gives everything and withholds nothing! But both sides of the situation should be examined carefully.

And then there are the avenues and approaches that lead to executive position. The accompanying salary and scientific and social prestige are tempting, but the added responsibilities are most devastating to one's research. Gregor Mendel assuming the abbotship of his monastery is, I suppose, a classic instance. He had the whole run of the cloister garden now in which to grow his famous peas, but his research days were over.

Yet, I suppose, as long as there are executive positions to be had, scientists—good scientists—will be found to accept them. In one's own institution in particular, when one is offered an executive position, the headship of a department or a deanship, one must either accept oneself or run the risk of submitting to the administrative authority of a colleague who will accept. In self defense one assumes the additional burden.

Some executives have fought this obstacle to their personal integrity. Clarence Cook Little, while president of the University of Michigan, maintained a laboratory and a research assistant in the medical building for continued study of cancer in mice. And Alexander G. Ruthven, the present president of the same University, still works on snakes.

But one must maintain one's perspective. Recently I heard Dr. Ruthven speak before the Seattle alumni of the University of Michigan on the work of the university. He had been one of my zoology professors. I had sat through his lectures in zoogeography. He was on the committee that examined me for my doctor's degree. When I heard that he had been selected for the presidency of the university my pride in his promotion was tinged with apprehension. The institution might gain a president, but was it not in danger of losing a zoologist? That evening served to allay my fears. The university had gained as much as it had lost. We must not make a fetish of our science. The challenges and opportunities of life must be met as they occur. Plato felt justified in leaving the Academy to direct the destinies of Syracuse.

Entirely apart from the matter of economic security are the general social obstacles to research. The spectacle of a person interested in knowledge for its own sake is to most individuals perplexing. The instinct of the herd is to suspicion and then to expell a nonconforming member, and a devotion to science, with the inevitable partial disregard for some of the more ordinary things of life, is nonconformity of a serious sort. Nor is it only persons distant or unrelated to us that are likely to suspect us. Those who are closest are frequently the least understanding: a mother, a spouse, or a child. They do not understand us, but they love us. And the more they love us the more do they fail to grasp our devotion to what seems to them so strange and so alien. A movie, an evening of cards, a vacation at home or by the seashore—activities so harmless and normal to the person whose day's work is done when the clock strikes five—may cut into the very life of one who has caught a vision of existence as something more than a round of eating, sleeping, and reproduction.

It is all so intangible. "There now, dear, put away the bugs!" Comes morning, or next week, or next month, and one takes up the task where it was left. Nothing lost—to all outward appearance. Yet, "art is long and time is fleeting" and the funeral drums of the poet are sounding in our ears.

Firmness and decision, a careful weighing of ultimate values, this is the only admonition one can offer. We are human beings as well as scientists.

Finally, one may be a woman! I have sometimes thought that the subject of *Women in Science* was worthy of extended treatment—but I shall spare you most of the details at present. I must remind you, though, that we live in an age that is only just next door to the cave man, when the prospective bride was dragged off by the hair and liked it!

I could make a devasting case for the superiority of the male in scientific work. I could show that with the almost single exception of Marie Curie, there are no first class scientists who are women, and that to make a sizable list of second and third class scientists of the same sex is very difficult. One may even generalize and say that in no field in which men and women compete together on an equal basis and in which the immediate personality is involved are women the equals of the men. The stage is no exception, because there the function of a woman is distinct. Prose fiction is no exception, because there the immediate personality is not involved. Novelists are judged only by their works, and, if the book is good, nobody cares whether a man or a woman wrote it. But scientific research performed as it is by persons holding actual jobs involving actual human contacts, is no exception. Verily, among the socially imposed obstacles to research, none is greater than femininity!

There are fine spun theories about woman's inferiority to man. She has a smaller brain. Therefore, she must be inferior. What such theorists lack is a little zoology. A glance at our cousins, the anthropoids, reveals that man has come from a stock in which the male is physically larger and more powerful than the female. The status of woman in the civilized world is a social inheritance from the days in which man dominated woman because he was physically able to do so and is evidence that we are not yet intelligent enough to realize that in intellectual power there is no significant difference between the sexes.

We do learn, however. Especially in America woman is slowly coming into her own, but only so long as she represses her reproductive instincts. Let her attempt to satisfy these outside the limits of matrimony, and she becomes a social outcast. Let her attempt to satisfy them within its limits, and a whole chain of social forces is loosed against her. Of all the external obstacles to research that a woman faces, the greatest of all is matrimony. Before marriage the struggle is difficult enough, though the difficulties then are largely a result of the frequent recognition by herself and by others that if and when she marries, her research interests must, in all probability, terminate. After marriage, the difficulties become almost insuperable.

First, she may have a conventional husband, who may entertain the idea that it is the function of a man to keep his wife in idleness and economic security and who looks with disapproval on the engagement of his wife in any unusual or unconventional activity.

Secondly, there is a widespread but declining objection to the employment of married women in positions in connection with which research can be done. There is, for instance, the regulation at the University of Washington that prevents both a man and his wife from being employed by the university.

Third, with the economic security that marriage gives a woman, there is the removal of the stimulus to do research as an aid to professional advancement.

Fourth, if the economic resources of the family are limited, it is usually expedient to utilize them to advance the interests of the husband, upon whom depends the future economic status of the family.

Fifth, in a family of limited economic resources, there is the wife's heavy duty of maintaining the home and caring for the children.

Sixth, unless there is some outside place to which recourse may be had, there is the difficulty of maintaining a working place in the home.

Seventh, there is the whole social situation that is against her. Her family, her husband's family, her friends alike may view with distrust not unmixed with amusement, the spectacle of a woman interested in something other than babies, cooking, and bridge.

There are young women interested in scientific work who will read this. If you are genuinely interested in science and its advancement, you can do nothing finer and more important for yourselves, for your sex, for the husbands you someday may hope to marry, for science and our material and spiritual culture in general, than to see what you personally and individually can accomplish towards surmounting these manifold and very real difficulties in the way of scientific attainment for women. Only by definite positive achievement can women hope to attain equality of opportunity for employment that shall be for them, as for their husbands, independent of their matrimonial status. There is nothing more natural about the dependent status of women in matrimony than there was natural about the institution of negro slavery.

And you men who may someday be fortunate or discriminating enough to seek a scientific colleague for a wife, try to see that the impulse to create that you admired so much, or at least pretended to admire, before you married is preserved and cultivated afterwards. It will be something of a struggle, but I feel it will be worth it.

If the economic pressure is too great, the income too small, the babies too demanding—for it is no part of the plot that the babies must be eliminated!—see what can be done to keep the thread of the discourse alive. Some of the current literature can, perhaps, be studied and the day awaited when the family is sufficiently grown to permit scientific work to be resumed. The wife of Thomas Hunt Morgan returned to the genetics laboratory after her family was reared and produced a very intricate and brilliant piece of Drosophila research.

Such, then, are the lesser obstacles to research, those that come from the environment, the obstacles related to economic security and to the society and social relations in which we are involved. It remains to consider the greater obstacles that derive from one's own nature.

First, there is the matter of interest. Without interest one can do nothing.

The origins of scientific interest are among the most important problems facing anyone who is concerned with the nature of scientific work. Different persons vary tremendously in this respect. The writer has been interested in animals ever since his father began to take him, at the age of three to the circus; since, on his own initiative, at the age of nine, he began to compile a catalogue of the animal kingdom; and since, at the age of fifteen, he began a collection if insects! I have a friend, however, who is just as enthusiastic a beetle collector as I am who did not begin until he had graduated from college and entered the employ of the Bureau of Entomology. Darwin, at the age of 22, at the time he left England on the Beagle, was as yet undecided as to his life's work. And Isaac Newton never could make up his mind that mathematics rather than theology was his true calling!

The suspicion crosses my mind that the origins of scientific interest are multiple, ''polyphyletic'' in the terminology of the morphologist.

It is plausible to argue, for instance, that an important share of scientific interest is due to social maladjustment. A person who, for any reason, fails to adjust himself to other people is thrown back on his own resources and, a certain portion of the time, develops an interest in science. This is not to say that every recluse is a scientist. Nor is it necessary to conclude that every scientist is a recluse, though before one could make sure that a particular individual's interest was not due in its beginning to some degree of social maladjustment, one would have to make a very intimate enquiry into his early experiences. Many whose scientific interest first arose in this way have gone far towards overcoming their social disabilities.

As a corollary to this theory, it may be suggested that our social life is so complicated from the earliest school years onward that no individual who responds to these influences in anywhere nearly complete fashion ever has very much time and energy left for science.

This maladjustment may take numerous forms. The writer still remembers himself standing around the school house door at recess time waiting for the bell to ring that would readmit him to the building!

And I have been impressed in the course of my reading of the biography of Marie Curie, how, as nearly as an outsider can judge, her career hinged on the failure at the age of nineteen and twenty of her first love affair. Had she married then, the burdens of domesticity would have captivated her. But she was forced to go on with her life on another basis; she was led to Paris and the Sorbonne; and, by the time love entered her life a second time, at the age of twenty-seven and twenty-eight, she had laid the foundations which, despite a husband and two children, was to see her to two Noble Prizes and a professorship at the University of Paris.

How universal this maladjustment principle is in accounting for the development of scientific interest is not easy to say. The earlier in life the interest arises the more likely it would seem to be due to such a cause. But I would be very far from asserting that the vast potentialities of organized knowledge could not reveal themselves to a mature individual without that individual being in social maladjustment. This is especially true if the scientific work is taken up largely on a professional basis.

I have dilated thus on the origin of scientific interest because its lack is the one supreme obstacle to research. The individual may be keen, close to the top of his class in scholarship, he may be very much impressed with the enthusiasm with which one of his professors is carrying on his own scientific studies, he may even, under close supervision turn out a meritorious report on some assigned problem, or he may succeed under continued supervision in a so-called "research" position. Despite this, he may still lack the ability to go on by himself under his own impetus, month after month, year after year, to discover and formulate his own problems and to see them through to such conclusions as the data may permit.

Unfortunately, I have no suggestion to make as to how to create interest in students or children. They either have it or they lack it. Either way all the exhortation in the world is superfluous. I got very little of inspiration from any of my university professors. I didn't need that because I had my inspiration already. But such soundness of scholarship as I possess came from their instruction. One can do no more than give to the interested ones what help one can in advancing their interests, training and discipline. I advise students in zoology to secure an adequate training in the fundamentals: German, French, chemistry. It isn't pleasant advice. Some take it; some don't—that is their affair. But those that fail to take it eventually wish they had!

Lack of time and inadequate facilities are frequently held up as research obstacles. They are usually evidence of absence of adaptability in the research worker. Aristotle in his Ethics speaks of the wise man as ''making the best of his circumstances, like a skillful general who marshals his limited forces with all the strategy of war.'' Similarly the research worker must adapt his program to his opportunities.

Sometimes, however, such a plaint is no more than a subterfuge. The individual is not really interested in research, although he realizes that he should be. Lack of time is the excuse he alleges as to why he doesn't get any research done, and the pitiful part is he eventually comes to believe it himself. Within wide limits all of us find time for the things that we really want to do!

Another obstacle to research is difficulty of publication. Many persons of the most indefatigable interest do not get their results into print. Sometimes this is due to the form which they have allowed their manuscripts to take. Students of plant and animals classification are especially prone to the preparation of ponderous manuscripts which it becomes almost impossible financially to publish. Frequently long years are spent in their preparation, and the discouragement resultant upon failure to secure publication is so great that further effort at research decreases or disappears. Single great monographs are admirable, but numerous shorter papers are preferable to nothing at all and are much easier to get printed.

More frequently, however, failure to publish is due to a failure to get any copy into the hands of the editor or the printer. Neither of these gentlemen are mind readers! The individual forgets that just as he has benefitted by the publications of others, so others will benefit by his publications. The remedy here again is short papers. If one hasn't the patience to work out a monograph, one can at least announce his results in brief publications that can be prepared while the subject is still in mind, before it has become cold. But this sort of a failure to publish is more an obstacle in the research program of others than of our own. Our colleagues are thus deprived of the knowledge of what we have done and are likely to be led into a duplication of effort.

One's own increasing knowledge is, paradoxically, sometimes another apparent obstacle to progress in research, but in reality is a tempering rather than an obstructive influence. 'Socrates said that one of the important steps in true knowldege is awareness of one's own ignorance. Very frequently increasing data serve only to make one realize how really little he actually knows about his problem and he becomes far less ready to announce his results than he was in the early stages of his studies. Caution is advisable, but too much is as foolish as too little. Fail to announce your own relatively mature but still incomplete studies and some less qualified person than yourself is likely to come in. Science advances as data accumulates and even a tentative conclusion in the hands of one person may serve to light the way to an important generalization in the mind of another.

Then there is the matter of philosophical outlook. Too much or too little philosophy is equally apt to prove injurious to a vigorous research program. One must keep his perspective and his point of view on the one hand. On the other hand, science has advanced by the efficacious application of certain techniques to the classification and manipulation of certain sense data. One must not ask more of science than it has to offer. If one is too greatly concerned with the ultimate consequences of every observation and every hypothesis, he stands in great danger of having his whole scientific thought stultified. Furthermore, science does not offer a solution to all of life's problems. It is a specialized field that has proven vastly effective in giving man an understanding and control of certain features of his environment. It is, however, neither an esthetics nor a religion. Let it be kept in its place.

There is also the matter of honesty—not the variety that keeps one from stealing the neighbor's silverware, but the infinitely more difficult sort that permits one to judge the work of himself and his colleagues and predecessors alike with objectivity. It is difficult to avoid the extreme that either blindly accepts or equally blindly rejects that which one has been taught. As regards one's own work and that of one's colleagues—blindly, jealously, stubbornly, to defend the one or equally stubbornly to carp at the other: such a course of stupidity injures no one but oneself.

There is physical health. Those who are young and have rarely or never known a day of illness have difficulty in realizing the tremendous obstacle that a refractory body constitutes. Students of the life of Charles Darwin know of the almost complete invalidism from which he suffered for years and how he doggedly hung on to the objectives which he had set for himself, if only to the extent of a few minutes a day.

Huxley, in later life, suffered much ill health, as did the zoologist and geologist, James Dwight Dana of Yale, and many others.

Two years ago this June there sat in my office for the first and last time Cyrus Crosby, extension entomologist of Cornell University and one of the two or three outstanding American arachnologists. The entomologists who were visiting the campus came crowding in anxious to have a word with the famous ''Cy'' Crosby. But when they had gone, Cy settled down to talk to me about spiders. Really, I knew very little about spiders, but I was at least an appreciative audience. He confided in me that he was in reality an entomologist only until five o'clock in the afternoon. Then he got up and went around to the other side of his desk and became an arachnologist! And he told be about his spiders, how to collect quickly into sacks the moss containing them in the mosquito infested bogs and then to sort over this material at one's leisure, how many interesting new genera were to be found, and many other things.

And then, less than a year later, at the age of only 56, at the height of his scientific achievement, Cy Crosby dropped dead at a scientific meeting in Rochester. Nor was I surprised. He was an enormous man, about as broad as he was tall. His heart had simply refused longer to service that mountain of flesh.

It is, of course, platitudinous to urge that a scientist should employ the same objectivity in using his body as in analyzing his data. Medical science has and is making vast strides in understanding the body's mechanism, and relatively insignificant symptoms that a former generation would have put down to imagination or laziness are now recognizable as the results of maladjustments that can frequently be simply remedied. In general, the famous mean of Aristotle's *Ethics,* that is so frequently called upon whenever matters of conduct are discussed, again seems to be in order: not so little that one over-develops, not so much that one runs the danger of physical and nervous exhaustion. But this too: one has only one life to live. Better a shorter time or normal activity or, if that is what one really wants, of supernormal activity, than a longer period of useless invalidism. If Darwin had waited to get well before continuing with his studies, *The Origin of Species* would never have been written.

More important, though far subtler, than physical maladjustments are mental and temperamental ones. There are, in all probability, stolid self-satisfied individuals whose mental processes are as sure, as unfeeling, and as certain as the action of a calculating machine. Perhaps I am completely mistaken and most scientific work is this way. But, in my own case, I find my research is as nervous and as fitful as a wild colt. Some weeks, some months, even some years it goes fine and I accomplish a prodigious amount. And then again it is otherwise. If this were not the case, I probably never would have thought of discussing research and its obstacles.

The matter is difficult and is nowhere handled in much detail. It can only be suggested that one should learn to live with one's self! If one discovers that he works in streaks and starts, he should learn to utilize those moods to the utmost when they are upon him. The other times, then, may not be quite so dissatisfying.

A suggestive treatment not only of this matter of temperament but of the research spirit in general is Eric T. Bell's *Men of Mathematics* (1937). Here we find every kind and condition of man treated, rich man and poor man, aristocrat and peasant, healthy man and invalid, sane and insane, men who advanced slowly but surely over every obstacle, others held back for years by the rigors of an unfriendly environment, others who never did surmount their difficulties but found an early tragic death of disease and neglect—but all held together by the common fact that each one, if only for a few days or weeks, gave his life over to important mathematical discovery. If one is interested in a fascinating account of the scientific spirit, one can do no better than treat himself to this volume.

Bell tells about Count Joseph Louis La Grange, the greatest and the most modest mathematician of the eighteenth century. He unified the data for mechanics in somewhat the same fashion that Isaac Newton, in the previous century, had unified those of gravitation.

And then, after his fiftieth year, La Grange entered a period of blackest depression, with the "inescapable corollary that no human knowledge is worth striving for." "It was," continues Bell (p. 166) "a clear case of nervous exhaustion from long-continued and excessive overwork." The Parisians found him gentle and agreeable in conversation, but he never took the lead. He spoke but little and appeared distrait and profoundly melancholy. At Lavoisier's gatherings of scientific men, La Grange would stand staring absently out of a window, his back to the guests who had come to do him honor, a picture of sad indifference. He said himself that his enthusiasm was extinct and that he had lost the taste for mathematics. If he were told that some mathematician was engaged on an important research he would say, "So much the better; I began it; I shall not have to finish it!" His masterpiece, now published after long delay, "lay unopened on his desk for two years." He turned to other interests. Gradually the excitement of the French Revolution and the ministrations of a young wife, who was forty years his junior, restored his mental health, and he lived to an age of seventy-seven years, actively at work and honored on every hand.

And so, with La Grange's victory over himself, our discussion of obstacles to research may be brought to a close. It is an aspect of the adventure of the human spirit, and if I have made parts of this adventure more lucid than they have been before, this discourse has not been in vain.

OBSERVATIONS ON PARASITES IN THE DEER OF PENNSYLVANIA

NORMAN H. STEWART
Professor of Zoology, Bucknell University

PENNSYLVANIA with its vast natural environment for fish and game animals enjoys an enviable reputation for maintaining even today a wealth of these natural resources. Interest in continuing and improving the present status of our wild life is shared by all nature lovers, as well as by the hunters and the administrators of our game laws. The fluctuations in the numbers of game animals from year to year present a problem that is quite complex and involves many factors. Moreover, while the normal life history of these creatures in a state of health is still in need of study, our knowledge of their diseases is as yet quite fragmentary. Interest in the life of the deer of Pennsylvania has led to the studies herein described.

While on a field trip with my class in March 1928 along the banks of White Deer Creek in Union County, a dead deer was found and later taken to the laboratory for the preparation of its skeleton for the university museum. Mr. Geddes Simpson, my assistant, while boiling the deer's head called my attention to certain maggots or grubs that floated to the surface of the water. As no blow flies were yet abroad that season, it seemed that these specimens must have been inside the deer as parasites for some indefinite time, and as there were no marks of violence on the deer's body, and as there was food in the stomach, these grub as possibly related to the animal's death became interesting. A search of available texts revealed the grubs probably belonged to the genus Cephenomyia. The limited literature on this genus is rather widely scattered. Brauer (1863) describes the four European species Cephenomyia stimulator Clark in the roe deer; rufibarbis Mg., in red deer; ulrichii Br., in elk; and trompe L., in reindeer. Aldrich (1915) reviews the scanty reports of Cephenomyia found in North America which consisted at the time of his paper of one doubtful case of an adult fly, and several cases of larvae not of the species phobifer all from the southern or far western portions of the country. He describes as a new species adults of the genus collected on White Face Mountain in the Adirondacks of New York State by Mr. William T. Davis in 1914. He calls this species Cephenomyia abdominalis. In December 1929 Mr. Aldrich wrote me saying that this supposedly new species is identical with Cephenomyia phobifer Clark. Specimens of the larvae and drawings of them from our local collecting have been identified by Dr. A. O. Johannsen of Cornell University, and by Mr. Charles T. Greene of the Bureau of Entomology as doubtless belonging to this same species.

For a knowledge of the life history and habits of these parasites, we must depend on observations made on species other than Cephenomyia phobifer until its own life history is more fully known. Bergman (1899) gives us a splendid account of the species Cephenomyia trompe Linn., as he observed it in Lapland where it infests the reindeer, and Hadwen (1922) extends this knowledge by observations made upon the same species which had been introduced into Alaska with the reindeer. Adult flies of the species in question, Cephenomyia phobifer Clark, have been captured by a few fortunate collectors at high altitudes. Dr. Robert Matheson of Cornell University has shown me nine of these specimens which he obtained on White Face Mountain recently, and others have been recorded from similar situations, such as Mt. McIntyre, Mt. Skylight and Mt. Seward. As to the larvae of phobifer, I am not aware of any records of its discovery previous to our first case in 1928 as mentioned above, though larvae of related species, ulrichii Br., macrotis Br., and mexicana and two of doubtful species are referred to by Aldrich in his paper of 1915. It is interesting also that of the adults collected all were males up to 1917 according to Townsend (1917). As recently as 1930, Mr. Charles T. Greene of the United States Bureau of Entomology wrote me that flies of this genus (probably meaning species) had never been reared. Brauer in Lapland and Hadwen in Alaska succeeded in rearing Cephenomyia trompe Linn. My attempts to rear the species phobifer will be described in this paper later on.

A brief review of the life history of the species trompe Linn., as given by Bergman (1899) for the larval stages, together with some facts from the description of the adult phobifer by Aldrich (1915) will serve to make their unusual habits more clear. To quote Bergman, "The nose gadfly does not lay eggs, but bears larvae. Females contain up to 580 larvae. The newly born larva is 1.1 to 1.2 mm. in length." These are deposited upon the nostrils of the reindeer and crawl into the nasal cavity where they remain and undergo their larval development. This period covers the time from July until May of the following year. The second larval stage in which they measure from 6 mm. to 17 mm. is found from February to May. The third stage larvae which measures up to 23 mm. in length and 7.8 mm. in width may be found back in the nasopharynx during April, May, and even into June. These larger ones number about 30 to 60 in each reindeer. By their mouth hooks the grubs attach to the walls of the pharynx. The epithelium shows holes as a result of this habit and the tunica propria is thickened and mixed with cells. "Hyperaemia and bleeding, sometimes oedema, may occur in the surroundings of the throat pocket."

The mature larvae are broader toward the front end, strongly arched above and less so ventrally. The mouth hooks are large, like claws bent downward. The antennae are short, diverging outward. The anterior stigmata are small and button-like whereas the posterior stigmal plates are crescent shaped. Small sharp spines occur on the body rings. During May and June these third stage larvae detach themselves, creep forward into the nasal chamber proper, and due to their irritating effect are sneezed out onto the ground. They travel but a short distance and dig themselves into the ground. Within a day the larval skin has hardened into the pupal shell, and after another sixteen to thirty-one days, the adults emerge.

Turning to the description of the adult of Cephenomyia phobifer Clark, by Aldrich (1915) we learn that it is "a robust black species, the thorax with yellow pile, except a tuft of black over each wing, the abdomen black with black pile, the only known species with solid black pile in the abdomen beyond the first segment." The head and face are very wide, the antennae small, the mouth parts very small and hidden by the pile of the face. The legs are black. The wings have an apical cross vein, the cell open and the posterior cross vein joining the fourth vein some distance before the beginning of the apical cross vein. The length of the fly is 14 mm. and its wing 12 mm.

Since first coming across this parasite in Union County, Pennsylvania, in 1928, I have examined by dissection of the head over eighty deer and have learned of more that game protectors and friends have examined in joining in the search for the larva. Instruction in making the examination of heads has been given to game protectors at their district meetings and through the courtesy of the Board of Game Commissioners all the game protectors in the state have been instructed to be on the lookout for this parasite. But the recovery of the parasites is not as easy as it might seem. This is chiefly so, due to the fact that the grubs crawl out of the animal's nose or into the oesophagus when the body begins to cool after death. They may then be found, as I have found them, under the deer's head or inside the bag in which the head has been shipped. Dead and dried-up larvae may be located occasionally in the head long after the deer has died. Moreover, as the deer blow the mature larvae out of their noses in the spring, few if any can be found later than about June first. The hunting season for deer is in December in Pennsylvania. Even if hunters would give up the heads of their deer for dissection, mature larvae would not then be found which would be suitable for rearing experiments. Of the eighty or more deer examined, thirty-four had been too long dead to be of value in showing the changes in the tissues which the larvae produce. The remainder showed these changes, and eighteen of these proved to have living larvae still in them when dissected. To date fifty-four larvae have been recovered between the dates of March 7 and June 21. All deer examined previous to March 7 have been too long dead, those after June 21 had gotten rid of the grubs, though the inflammation remained. The larvae found range from 2.75 mm. to 31 mm. in length, most of them, however, being about 22 mm. to 25 mm, or third stage larvae. They have been taken from deer in the following counties of the state: Clearfield, Clinton, Lycoming, Union and Snyder, and deer with signs of having been affected by them have been sent me from Tioga and Montour counties.

It is interesting to note how many of these grubs may be found in a single deer. While I myself have not seen more than fourteen in one animal, Mr. William C. Kelly, a district game supervisor of Pennsylvania, found twenty in one doe's nose, on April 7, 1929, and Professor C. R. Walker of Western State College of Colorado, found seventy-two at one time during the month of March, near Gunnison, Colorado. A deer that had been "staggering around and falling repeatedly" was killed by Mr. Victor H. Cahalane at Brookfield, Michigan in May 1931, and proved on examination to contain no less than ninety larvae of Cephenomyia (sp) in its head!

The identification of larvae as belonging to the genus Cephenomyia is not difficult. Their large size, the eleven encircling bands of spines, the mouth hooks, and the kidney-shaped spiracular plates at the posterior end are easily noticeable. Dr. Fitch (1928) has given us a photograph of a mature larva, and I have elsewhere published (1930) a drawing from a fresh specimen and Simpson (1931) has described the internal anatomy. In March 1930 Mr. Charles T. Greene informed me that Cephenomyia phobifer Clark had never been reared. Accordingly in May 1935, I attempted to do so, placing the larvae in various surroundings, namely in damp soil, dry soil, damp moss, moist filter paper and dry sand covered with filter paper. Four of the larvae pupated after traveling about a day in the dry media. The others died before pupating. Of the four two moulded and softened. On the twenty-sixth day, I assumed the remaining two must be dead and opened them. One of these showed the fly formed to the point in which the main features could be seen, eyes, legs and wings, but it was still soft and white and I believe dead. The two that did not mould were on top of the filter paper above the dry sand. They evidently prefer a dry place. Cephenomyia trompe Linn. has been reared by Bergman and Hadwen.

The effect of these larvae in deer is an interesting question. Certain results are obvious. By cleaving the head the deer one sees the effects upon the lining of the nose and pharynx. Where larvae are attached by their hooks to the mucous membrane, the surrounding area is reddened with a purplish central area; the ethmoid region is coffee brown or even brownish gray in color (on occasions greenish gray), the turbinate or mid-region of the nasal chamber is usually brilliant blood red, while farther forward near the nostril it is purplish colored. On two occasions I have noticed that the meninges of the brain had this same coffee-brown discoloration, in one case in the frontal third, in the other along the lower surface of the brain. Two cases, in which the material was also fresh, showed this same color extending down the spinal cord, and a gelatinous fibrous exudate between the cord and the surrounding vertebrae. The blood vessels of the brain and the cord seem more than normally filled in a number of the deer I have dissected. Microscopic examination of the freshly fixed bits of the meninges shows many areas where the red corpuscles have escaped from the capillaries. These probably account for the brownish color. Through the courtesy of Dr. Simon Flexner of the Rockefeller Institute for Medical Research two deer's brains and cords taken from animals with severe inflammation of the nasal passages have been examined by the method of microscopic sections by Dr. Carl Ten-Broeck of the Department of Animal and Plant Pathology. Dr. Ten-Broeck reports finding vessels congested. He finds no bacteria, but does not consider this finding conclusive. He suggests that a virus may be involved and suggests further studies.

I have spoken of deer infested with this parasite staggering about and falling down. Several reports of this behavior are now at hand. For example Dr. Fitch (1928) examined a deer that "had been noticed for a number of days wandering aimlessly about and running head on toward a fence." He continues, "On opening the animal it was found that the region of the pharynx was highly congested, bloodshot. A number of larvae were found in this region." Mr. J. C. Reeder of Hyner, Clinton County, Penn. has given me a photograph of a deer that stood all day on his country property with mucous dripping from its nose and heedless of the dogs that barked at it continuously. He said he pushed the deer into the woods to get rid of it. How much I wished I could have examined this specimen! Fortunately, a deer in a similar helpless condition, but still just able to stand, was brought to me for examination. This animal had lost its ability to respond even to strong stimuli, such as a flashlight waved before its eyes, an apple held to its nose or my yelling in its ears. It held its head horizontally, and waved it slowly from side to side and frequently moved it far back against its side. Its senses were dulled, it was evidently unaware of its surroundings or quite unable to respond to them, yet it responded to some distress that made it continuously move its head. Such an animal would certainly not last long in the woods. Then we killed the deer and found three or four large Cephenomyia larvae in its naso-pharynx and severe inflammation in the nose. Its brain and cord were sent to Dr. TenBroeck as reported above. There was considerable food in the stomach.

The mortality of deer in Pennsylvania in the later winter is a matter of surprise to those who have not seen the published figures on this subject. Gerstell (1935) states that 949 dead deer were found by field officers of the Game Commission in the five months following December 1, 1934, and, of course, this must be a small fraction of the total number that perished. Most of these deer are found along the streams. It is not probable that they work down into the bottom of the valleys as hunger and disease overtake them, following, as it were, the line of least resistance? Many have evidently stumbled into the streams, and these are a menace to our town water supplies. Bergman (1899) reports a disease called by the Lapps ''varka'' or ''swaying disease'' caused by the parasite Cephenomyia in reindeer which he claims is a fatal malady. Fitch (1928) and Hadwen (1922) and others believe that in this country the parasite is but a contributing cause. Certainly malnutrition is common among deer of Pennsylvania in winter, especially in overstocked areas, and it is easy to see how the effects of this combined with any parasitic infection that interfered with the animal's feeding or with its coordination would endanger its life. A sentence from a letter received from Dr. Hadwen bears upon this point, and sets forth a conclusion based on his long experience in this field of study. It reads: ''yearlings in nearly all species of animals are rendered unthrifty and weak very often owing to infestation with a variety of parasites. If these weak debilitated animals are short of food, many of them die as a result of the combined effects of parasites and starvation.'' This, I think, describes the condition that we find in so many deer in the overstocked regions of Pennsylvania.

THROUGH A FALL FLOWER SHOW

EDNA HIGBEE

STATELY coconut palms surrounding a pebble stone court containing in its center, the points of a compass, greeted me as I entered the Bahama Key Room of the remodeled Phipps Conservatory, Pittsburgh. Beyond through lofty portals gaily colored chrysanthemums beckoned me to enter and see the beauties of the place for myself. Keeping company with the coconut palms I found plume, needle, porcupine, water, sugar, panama hat and spring date palms. Also Mexican breadfruit and bird of paradise plants. Another extremely interesting plant was one of the Cycads, which is very rare. In fact at the present time this is the only plant known to exist. It is not known how to propagate it nor is it known how to get it to form a seed as the sex of the plant can not be determined. Not having another plant to go with it there is no way at the present time of determining whether the plant can be fertilized or not.

The winding walk leads one to the first of the display rooms for the chrysanthemums. Here one finds yellow as the predominating color. Jean Hart (Japanese cascade type) droops in graceful curves from hanging baskets around the room and gives the entire group a festive appearance.

The mums in this room are represented by the following varieties:—Dr. W. R. Pettit, Ozola anemone, Louisa Pockett, Peggy Ann Hoover, Tuxedo anemone and Chrysanthemum Indicum the original chrysanthemum.

Passing from this room one meets an entirely different setting in the next, where gorgeous water lilies peep at one from the lily pond which is the main feature of the room. Around the edge of the pond bronze, white and yellow chrysanthemums have been grouped. The setting is fascinating and causes one to linger and drink in the beauties of the combination.

Next one glimpses a tiny stream flowing through a woods. Here chrysanthemums have been set in among the many azaleas, ferns and mountain laurel plants which of course are resting now and will be ready to play their part in the spring flower show. At the rear of the room two large magnolia trees and a rubber tree rise making a splendid background for the scene in front.

Leaving the lily pond one comes to a restoration of an early 14th century cloister garden, which has been adapted after a woodcut found in the book called Hortus Floridus. Wormy chestnut was used in the construction of the railings, trellis and detailed work of this room. Here a beautiful grass park is surrounded by white anemone, highlights, white show type and yellow chrysanthemums. Different hybrid forms of the yellow cascade—such as white, pink and yellow hang gracefully around part of this room.

Coming as a surprise among these rooms is the cactus house where we find examples of Euphorbia splendens madagascar, Euphorbia canarensis, Euphorbia havanensis from the Dutch East Indies and the Century plant which grows for 40 years before blooming.

Returning to the Palm Room we leave it by way of arched portals and enter two more rooms displaying chrysanthemums. The first of these is gorgeous with its varying shades of red mingled with white. A small pool is followed by a gradual rise in the ground which brings one to the rear where there is a background of Hibiscus, some of which are in bloom.

Again returning to the Palm Room we go out into another display room filled with the predominating yellow colored flowers. This room leads to the most outstanding portion of the remodeled conservatory. A series of three rooms joined together by beautiful arches—the real tropical display. Here is the orchid room, fern room and new tropical garden. One enters the new tropical garden over a stone bridge. Helxine (babies tears) forms a delicate ground covering over the arches of the bridge. It is thickly matted and seems to the layman as though someone had placed two beautiful green cushions there. After crossing the bridge the walk starts losing elevation. Half way down one comes to a beautiful setting. An aquarium in a recess in the wall is filled with catfish, sunfish and large sized gold fish, and has a setting of African violets in the foreground. The walls surrounding are filled with Epiphytes. Going on down to a still lower elevation one passes the lowest point under the bridge and again gains elevation until back at the starting point. The idea used in tunnels in the Canadian Rockies seems to have been applied here, that is, of losing and gaining elevation by having the path or road turn back on itself.

In this new room one finds all kinds of tropical vegetation among which can be mentioned banana plants, air plants (bromeliads), medinella from the Philippine Islands, Papaya, tropical carica, which is something like a cantaloupe when eaten, but the fruit grows on a small tree rather than on vines on the ground as is the case with cantaloupes.

In the fern room one finds some very rare specimens, such as, Hart's tongue fern, which is the rarest wild fern in America and is found only in about four localities among which are Central New York and Tennessee. Three conservatories in the country, Chicago, Cincinnati and Pittsburgh are the only ones to have Dicksonia antarctica ferns, which are found in the antarctic circle and southern tip of Queensland. Along with these extremely rare forms one finds the Australian tree fern with shingle vine climbing up the trunk. Staghorn, elks horn, rabbits foot, dracena and many others are represented. Beautiful hanging baskets with pitcher plants attached lend a finishing touch to the scene. The fern room blends so beautifully into the tropical room that at first one hardly realizes two separate rooms exist.

The orchid room lends itself to the same scene. This year many of the orchids were in bloom and added their delicateness of structure to the ensemble. Pittsburgh is quite proud of its rare collection of orchids and is doing much research work toward developing new plants from seeds.

* * *

EDITORIALS

"Once a Phi Sigma" Again

SHORTLY after the national meeting of Phi Sigma at Indianapolis last year, the BIOLOGIST carried an editorial encouraging the officers of the Chapters to contact all their former members on their respective campuses, to the end that the circle of actively interested members of Phi Sigma might be materially increased. There is no question that these years of depression and recession have caused many a former member to drop out of many an activity, especially where there were fees connected with participation. To bring these forgotten men and women back into active circulation in campus biological affairs should be a labor of love for all interested Chapter officials.

Rounding up the former members on your campus would mean a largely increased active membership. What this would mean in cooperative enthusiasm would be hard to predict. One fine effect it would produce would be the stepping up the number of readers of this magazine. So doing would increase its circulation materially. An increased circulation means an extended appeal to advertisers. More advertising would decrease the expense of publishing each issue, at a material saving to the Society.

To each and every Chapter Officer the editor of THE BIOLOGIST extends a personal invitation and an earnest request that they make the slogan, ''Once a Phi Sigma, always a Phi Sigma,'' one hundred per cent effective on their own campus, and in their own Chapter.

Speaking of advertisers reminds us that one of our oldest patrons, the Clay-Adams Company, has recently changed its address as is indicated on the new advertisement in this issue. It might be well if our readers investigated the offerings of this and the other reputable concerns who show their confidence in Phi Sigma by advertising in THE BIOLOGIST.

Chapter News, And How?

WITH news items from twenty-seven chapters in this issue, it is believed that this issue of our society quarterly sets a new high in our history for chapter cooperation. That most of this news was accumulated in a two-week period is also noteworthy. There has always been some discussion over the time that should be allotted to collecting chapter news. Some maintain that a short and snappy request is better, since it annoys less in that the secretaries or chapter editors get the matter disposed of and ou of the way more quickly. Others maintain that a considerable length of time should be allowed to elapse so that chapter officers could leisurely gather their news together. All of which is very plausible but the more leisurely the gathering the longer the wait, until it becomes certain it never will arrive in time before going to press.

If there is one request the editor of THE BIOLOGIST would like to make, it would be that Chapter Officers should be constantly on the watch for the manuscripts of interesting talks given before their chapter meetings, no matter by whom. As long as the contents of the addresses are not reports of original research, they will probably be of real interest to fifteen hundred other members of Phi Sigma besides those in the home chapter. As one looks over the back issues of THE BIOLOGIST, one cannot fail to be impressed with the number of stimulating chapter talks from responsible and leading scientists that have been chronicled in the Chapter News Letters. Why these fine papers should be permitted to go down into unmerited oblivion has always been a mystery. Why do not Chapter Officers realize how much any visiting speaker is flattered by the request for his manuscript for publication in our journal? If they did realize it THE BIOLOGIST would be richer by many interesting articles, and the Chapters would be richer by friends who would not mind a little more frequent invitations to talk before the brethren.

While we are on this point, we cannot stress too strongly, definitely, finally, not to say emphatically, that THE BIOLOGIST is *no place* for the publication of original research, no matter how insignificant. We are not attempting to run competition with the established journals of the scientific societies. Ours is a little interchapter organ, for the exchange of ideas, and helpful suggestions to stimulate research. Research papers, however, should appear where they will be noticed by the research workers in the particular field, where they will be quoted, abstracted and permanently become a contribution to our scientific knowledge. Hardly an issue of this quarterly goes to press but a new flock of student papers painfully gotten together, organized and authenticated with sometimes extensive bibliographies, do not have to be sent back to chagrined pledges or initiates who fondly awaited seeing their intellectual brain-children in the next issue of THE BIOLOGIST. We have a case in mind, a pledge-paper, with a bibliography, carefully written, which has just been sent in. Yet who wants to read an undergraduate's contribution, fourteen pages long, on the subject of "Evolution?" Term papers like these as well as original research are not what the readers of THE BIOLOGIST want.

Where Do The Biologists Go?

CHAPTER members who casually receive their copy of THE BIOLOGIST sometimes become interested in the disposition of the sixteen to eighteen hundred copies of each issue which come from the printer.

First of all, to each Chapter goes sufficient copies to supply every active, faculty and honorary member on the local campus, *providing* the Chapter Secretary has requisitioned sufficient numbers from the National Treasurer in advance. Then, some two hundred and fifty copies are sent to the Editor, for distribution as follows: to all annual paid subscribers, to all contributors, to the main library of every institution where a Chapter of Phi Sigma is located, and to the advertisers. The balance of the issue is partly stored with the National Secretary, and partly with the Editor, since to these officers come the most frequent requests for copies from former members, institutions, and concerns. Sometimes, if the chapter officers are lax in making their requests for their share of copies, there may be a slight surplus to be stored for future reference. At other times,—this fall for instance,—some chapter officers delay action until the last moment, then requisition unusually large numbers of copies. This sometimes cuts the back number files with the Secretary away below the danger line, since at least fifty or more copies should be kept in reserve for future requests and binding.

Silver Anniversary?

A WELCOME bit of information has just leaked out from the National Secretary's office. Phi Sigma memberships are rapidly approaching the 10,000 mark. This brings to mind the fact that next December the Ninth National Convention will probably take place, as usual with the A. A. A. S. at its midwinter meetings in Columbus, Ohio. Now, unless you should overlook the fact, let your Editor remind you that December 1939, is pretty close to March 17, 1940. And the latter date is the twenty-fifth anniversary of the founding of Phi Sigma at Ohio State University in Columbus. Where could we more fittingly assemble to celebrate the first quarter-century of our corporate existence, to call back, or recall in memory, our past National Officers, and relive the past of our 10,000 members? It's worth beginning to think about.

CHAPTER NEWS LETTERS

Beta—Michigan

President—John Brookhart, Dept. Physiology, U. Mich., Ann Arbor, Mich.
Vice-President—LeRoy Harvey, Dept. Botany.
Secretary—Grace Orton, Dept. Zoology.
Treasurer—K. Eugene Goellner, University Museums.

Epsilon—Denver

President—Robert Searway, 2175 S. High St., Denver, Colo.
Vice-President—Charles Hansen.
Secretary-Treasurer—Helen E. Dowling, Dept. Anthropology, Univ. Denver, Denver, Colo. (or 3432 West 33rd Ave.)

The first meeting of the year was held on September 22 for the purpose of making plans for the coming year and for the admission of new members.

On October 5, the following were pledged to Epsilon chapter: Luella Borden, Evelyn Brodie, William Cormack, John Denst, Eleanor Knight, David Kramish, Donn L. Smith, Esther Jane Wood, Robert Wurtzebach. The initiation service for these members was held on Sunday, December 4, at the Sigma Alpha Epsilon house. After the banquet and initiation, Dr. Margaret F. Boos of the Department of Geology of Denver University gave an illustrated lecture on: ''Geologic Features of the Denver Area.''

At our bi-monthly meetings prior to initiation every pledge was asked to present a paper dealing with his individual research problem or with a phase of the biological science of special interest to him. Some excellent papers were given.

HELEN E. DOWLING.

Zeta—Wisconsin

President—Gordon Worley, Memorial Institute Building.
Vice-President—David G. Frey, Biology Building.
Secretary—Robert H. Burris, Agricultural Hall.
Program Secretary—Robert M. Stern, Agricultural Hall.
Treasurer—Marcus I. Wegner, Agricultural Chemistry Building.
Editor—John W. Thomson, Jr., Biology Building.

One of the perennial problems of the student is the question of what he will be doing after getting his degree. With the idea of showing what some of our members are doing and also to aid some of our other chapters in keeping contact with alumni members of our chapter, we think that it is of interest to show what some of the members of Zeta chapter who got their degrees last year are now engaged in.

W. B. Youmans from the Medical School here is teaching Physiology in the Medical School of the University of Oregon. From the Department of Dairy Industry: E. L. Byers is now an assistant supervising laboratories in the Dairy Plant at the University of Wisconsin; Willard Langhus and A. M. Swanson are Industrial Fellows in the Department of Dairy Industry at the University of Wisconsin; Paul Miller is an Associate Dairyman at Clemson Agricultural College, Clemson, South Carolina; John Pfeffer is bacteriologist for the Pet Milk Co. at Greenville, Illinois.

From the Dept. of Zoology: R. W. Pennak has gone to the University of Colorado as instructor in Zoology; Ivan Pratt has gone to the University of Indiana as instructor in Zoology; Roy Forster is teaching Zoology at Dartmouth College; and E. Waletsky and his wife are visiting in Germany. From the Dept. of Botany: Robert Duncan is at the Victoria University of Manchester, England, on a National Research Council Fellowship, studying Apospory and Apogamy in Ferns; Fred Wolf, also recipient of a National Research Council Fellowship, is at Harvard continuing his studies on the Saprolegniales; Lester Coonen is Assistant Professor of Biology at De Sales College, Toledo, Ohio; W. Whitman is botanist at the North Dakota State Agricultural Experiment Station at Fargo.

From the Department of Agriculture: Julius Berger is now research assistant in Agricultural Bacteriology and Biochemistry at the University of Wisconsin; D. R. Collingsworth is with the Red Star Yeast Co. at Milwaukee, Wisconsin; and N. O. Sjolander is engaged in research at the Tennessee State Agricultural Experiment Station.

J. W. THOMSON, JR.

Iota—Washington University

Treasurer and Act. Secretary—Thomas Johnson, Dept. Botany, Washington Univ., St. Louis.

Iota initiated the following on December 7: Mary Ethel Alexander, Clyde Berry, Virginia Patricia Betts, Mary Waller Cunningham, Hugh Carson Cutler, Edward Walter Czebrinski, Jules Matthew Don, Patricia Anne Farnsworth, David Feldman, Louis August Gottschalk, Juanita DeWitt Hunsaker, Leonard Kneznekoff, Shirley Evelyn Ritter, Burton Albert Shatz, Uca Frances Simms, Frederick Taussig, Anthony Ralph Tortora, Bernice Wittcoff.

Kappa—University of Kansas

President—Max Wheatly, 218 Snow Hall, University of Kansas, Lawrence, Kansas.
Vice-President—Gerald B. Pees, 22 Frank Strong Hall, University of Kansas.
Secretary—202 Snow Hall University of Kansas.
Treasurer—Virginia E. Detler, 1244 Rhode Island Ave.

Then annual fall initiation banquet of Kappa chapter was held November 21, 1938. The initiation was prior to the banquet, and the following people were admitted to full membership:

Bacteriology Department: Geo. E. Sanders, Charles Shrader, Marvin P. Baecker, Elmer E. Hinton, Dean Gough; Botany Department: W. D. Durell, Robert Lommasson; Entomology Department: Reese I. Sailer; Geology Department: J. Howard Lane, Jr.; Physiology Department: Earl H. Dearborn; Zoology Department: Alice E. Smith.

The guest of honor at the banquet was Dr. J. Bronfenbrenner, head of the Bacteriology Department at Washington University in St. Louis. Later in the evening Dr. Bronfenbrenner spoke in Fraser Theatre on the subject of ''Bacteriophage—It's Nature and Mode of Action.'' The lecture was illustrated with slides and motion pictures, and was well attended by the science departments of the university.

Signed: Mildred Purcell, *Secretary.*

P. S. We should like to have Kansas featured in an issue of *The Biologist* in the near future. Will you please advise me about how you wish this material presented to you?

M. P.

Lambda—Montana

President—Laurence Osburnsen, 116 Monroe, Missoula, Montana.
Vice-President—James Whilt, Corben Hall, Missoula, Montana.
Secretary—Aloha Hannah, 408 Daly Ave., Missoula, Montana.
Treasurer—R. Bernard Brink, 812 Beckwith Ave., Missoula, Montana.

The spring initiation was held for Martha Jenkins, Ben Morris and Donald Lynch at an outdoor picnic at Montana Power Park May 27. At the same time the new officers were installed.

This fall, Dr. J. W. Severy of the Botany Department and Dean T. C. Spaulding of the Forestry School gave very interesting talks about the history of Lambda chapter, and Dave McClay of the Forest Service gave an illustrated talk on ''Wild Life.''

On January twenty-fourth the chapter will initiate twenty-two new members.

Botany: Rene Blondeau, Allen Chesbro, Jack Miller and James Salinas.

Bacteriology: Nancy Lennis.

Forestry: Donald Beck, Muril Brunsvold, Meril Carter, Earl Clark, Harry Corry, Eugene Elliot, George Fritz, Philip McLeod, George Mead, Laurence Olson, Foster Polly and Edward Shults.

Pharmacy: Hubert Murphy and Ann Pichioni.

Zoology: Thomas Rogers and Oliver Roholt.

ALOHA HANNAH.

Mu—California

President—Dilworth D. Jensen, Dept. Entomology, Univ. Calif., Berkeley, Calif.
Vice-President—Eldon Gardner, Dept. Zoology.
Secretary—Beryl O. Schreiber, Dept. Botany.
Treasurer—John W. Johnson, Dept. Entomology, Agric. Hall.

Mu Chapter has just terminated a most successful semester with three dinner meetings and two Stanford-California biology exchange seminars.

Our first dinner meeting was held September 21. Dr. A. E. Michelbacher, Junior Entomologist, Agricultural Experiment Station, talked about his trip into Lower California. The excellent colored slides and pictures taken by Ed Ross, a Phi Sigma member who accompanied Dr. Michelbacher, well illustrated the talk.

October 20 was the date of our second dinner meeting. Dr. Cooley, a guest, from the Public Health Laboratory in Montana, gave a few words on his research on wood ticks and Rocky Mountain Spotted Fever. The speaker of the evening was Dr. Robert Miller, new director of the California Academy of Sciences in San Francisco. His subject was "Photoperiodism" with special reference to birds.

The formal initiation banquet was held on November 30 at which eighteen new members were initiated. They include the following: Agricultural Technology: Maurice L. Steinacher; Bacteriology: Angela M. Capobianco; Entomology: Richard L. Doutt, George S. Kido, Charles D. Michener, Wilson Sampson, Nathan Stahler, Neil Stanger, Burdette White; Genetics: John W. Duffield; Psychology: Frances H. Musgrove; Zoology: Elmer Aldrich, Frederick H. Dale, Roy B. Johnson, Aldo S. Leopold, Thomas P. Maslin, Donald T. Tappe and Daniel F. Tillotson. President Dilworth Jensen acted as toastmaster and John W. Duffield gave the response for the initiates. Dr. C. A. Kofoid spoke on "Hunting the Gaur and Elephant in the Indian Jungles" illustrated with slides.

Our chapter is sponsoring a series of exchange seminars between the University of California and Stanford University. The purpose of the seminars is to give opportunity for exchange of viewpoints and ideas among the graduate students, of the two schools, who have similar interests in the biological sciences. Six seminars are to be held during the school year, three at each university, two of which have already been conducted. The first was held at Stanford on October 27. Mr. Robert L. Usinger of the University of California, Department of Entomology, discussed the subject ''Pacific Island Biogeography.'' On November 17 Mr. Craig Taylor of Stanford, led the seminar at Berkeley. His topic was ''Steady State Studies in Human Exercise Physiology.''

BERYL O. SCHREIBER, *Secretary.*

Nu—Washington and Jefferson

President—F. H. McNutt, Jr., Lambda Chi Alpha, Washington, Pa.
Vice-President—Garriel Marino, Caldwell House, 140 E. Wheeling St., Washington, Pa.
Secretary—R. C. Montgomery, 432 E. Chestnut St., Washington, Pa.
Treasurer—H. G. Grether, 34 So. Lincoln St., Washington, Pa.

At the annual initiation seven new members were installed into Nu chapter. They are as follows: Robert Breckenridge, Lee Conrad, Ned Dosckes, Walter Kasserman, Norman Lindquist, Don Rose and North Sterrett.

Following the initiation Mr. Frank Judson delivered a splendid talk on ''Bacteriology''. Then Mr. Herbert Grether read a paper on ''The Development of the Microscope''. Both were well received, and were interspersed with humor.

Nu chapter is planning to hold a seminar in the future. We are also preparing for a biological exhibit for open-house in the spring.

RICHARD MONTGOMERY.

Pi—Emory

President—Merrill Lineback, 605 Seminole Ave., Atlanta, Ga.
Vice-President—Dorothy Lunsford, 1614 N. Decatur Rd., Atlanta, Ga.
Secretary—Mary Stipe, 1161 Ponce de Leon, Atlanta, Ga.
Treasurer—Charles Uhl, 1063 E. Clifton Rd., N. E., Atlanta, Ga.

Pi chapter of Phi Sigma opened its activities for the year with a steak fry at Stone Mt. The Biology students of both Emory University and Agnes Scott College were invited. Our new faculty member, Dr. H. M. Phillips, and Mrs. Phillips, from the University of Virginia, were introduced.

At the next meeting, to be held November 10, we will have as our speaker, Dr. J. M. Andrews of the Georgia State Department of Health. The entire Biology department will be invited since the meeting is one of special interest.

The medal for the most outstanding work of the year in Biology was awarded at our final meeting in May to James McCranie, who is continuing his work this year at the University of Michigan. We also inaugurated the following officers: Merrill Linebach, president; Dorothy Lunsford, vice president; Charles Uhl, treasurer; Mary Stipe, secretary. There new members were initiated. They are Margaret Olsen, Roy Robertson, and George McKinney.

The second meeting of the school year of Pi chapter was held November 10, at the home Dr. R. C. Rhodes. The speaker of the evening was Dr. Justin M. Andrews, formerly of Johns Hopkins University, who is now connected with the Georgia State Department of Health. He spoke on "Studies on Trichomonas foetus," on which he has done extensive research.

Pi chapter met again December 8, at the home of Dr. W. B. Baker. The speaker was Dr. H. M. Phillips, the new instructor in Biology at Emory University. Dr. Phillips came to Emory from the University of Virginia. The subject of his talk was "Karyology and Its Relationship to Speciation." New members were elected at this meeting. They are: Dr. H. M. Phillips, Jeanne Matthews, Lillian Carpenter, Thomas Oliver, Rafe Banks.

At the last meeting of the 1937-38 school year, the Phi Sigma medal for the most outstanding work among the students was awarded to E. James McCranie of Milan, Georgia, who is studying this year at the University of Michigan. Also the following new members were initiated: Roy Robertson, Margaret Olson, George McKinney.

Rho—Illinois

President—Edna M. Pratt, Zoology Dept. University of Ill., Urbana, Ill.
Vice-President—Marvin C. Meyer, Zoology Dept. University of Ill., Urbana, Ill.
Secretary—Robert C. Rendtorff, State Nat. Hist. Survey, 1219 Nat. History Bldg., University of Ill., Urbana, Ill.
Treasurer—Parker R. Beamer, Bacteriology Dept., Univ. of Ill.

The following persons were initiated into Rho chapter on May 26, 1938.

Faculty Membership: Dr. True W. Robinson, Zoology; Bacteriology: Charles Marion Ford, George Gordon Gralak; Botany: Wayne Hessong

Silver; Entomology: Arthur Edward Ritcher; Plant Breeding: Oren Bolin; Zoology: Jane Claire Dirks, Reed Winget Fautin, Edward Ferguson, Jr., Eugene Pleasants Odum, Victor Sprague.

The initiation ceremony was followed by a banquet at which Dr. J. B. Ruyle, President, Illinois Archeological Society, addressed the group on "Along Ancient Trails With the Biologist." Dr. H. J. Fuller of the Botany department acted as toastmaster.

Yours truly,

R. C. Rendtorff, *Secretary.*

Sigma—Florida

President—John R. Preer, 335 N. Washington St., Gainesville, Florida.
Vice-President—Wilbur B. DeVall, School of Forestry, Univ. Fla., Gainesville, Florida.
Secretary—Charles Benton, 1436 W. University Ave., Gainesville, Florida.
Treasurer—Kenneth Smith, Biology Dept., Univ. Fla., Gainesville, Florida.

The members of Sigma chapter decided decided that it would be quite in keeping with the spirit of Phi Sigma to install the new officers and hold the fall initiation at an out-of-doors meeting.

So a picnic was held on November 21 in the Austin Cary Memorial Forest. Mr. and Mrs. Wilbur DeVall and Mr. Kenneth Swinford were interested enough to go to the picnic grounds about an hour before the rest of the crowd and build a fire and start the supper cooking. The rest of the chapter members and pledges left Science Hall at 6:00 o'clock and reached the picnic grounds at about 6:30.

When everyone had arrived, the pledges were instructed to go out and return in ten minutes with three representatives of each of the following genera: Astacus, Treponema, Botulinum, Limodorum, Pneumoneces, Rhamaswiella, Rana, Cynoxylon, Pilostaxis, Isonychia, Melanopus, Tipula, Bothrops. Upon the return of the pledges with their various "finds", each was asked to describe an imaginary new species that he had found and to name it. Some of the descriptions were very amusing and ingenious.

A delicious steak supper was enjoyed by everyone.

The next thing on the program was the installation of officers by Coleman Goin, the retiring vice-president. The following officers were installed: John Preer, president; Wilbur DeVall, vice-president; Charles Benton, secretary; Kenneth Smith, treasurer.

The following were then initiated: Richard Empie, William Faville, Lewis Marchand, Orville Struthers, George Williams. Dr. T. H. Hubbell presented the keys and membership certificates to the new members.

Respectfully submitted,

Charles Benton, *Secretary.*

Tau—Duke

President—E. S. Luttrell, Botany Dept., Univ. Durham, N. C.
Vice-President—Mangrum, Zoology Dept.
Secretary—V. G. Watkins, Forestry Dept.
Treasurer—Catherine Goffin, Zoology Dept.

Tau chapter held its annual banquet on December 6 in the University Union. Our speaker was Dr. A. W. Perlzweig of the Duke Medical School. His subject was "The Integration of the Sciences." New members initiated at the banquet are:

Zoology: Joe Bonnet, Charles Boyer, Ellsworth Cook, Martha Down, Kenneth Duke, Harriet Fisher, William Garner, John Glasson, Charles Kilduff, Maxine Perdue, Helen Ramsey, Roy Talmage, Mary Wolf; Botany: Mary Humphreys, Jerry Moore; Forestry: Alfred Morrison, James Scarff.

E. S. Luttrell, *President.*

Upsilon—Miami

President—Charles Heintzelman, Elliot Hall, Oxford, Ohio.
Vice-President—Ann North, Wells Hall, Oxford, Ohio.
Recording Secretary—John Ellis, Phi Delta Theta House, Oxford, Ohio.
Corresponding Secretary—Roger Harned, 116 W. Collins St., Oxford, Ohio.
Treasurer—William Lunsford, Elliot Hall, Oxford, Ohio.
Advisor—Dr. P. S. Crowell, Tallawanda Apts., Oxford, Ohio.

Upsilon chapter announces that it is having one of the most successful years of its history. Formal initiation was held December 1, 1938. The following were initiated: Arthur Assum, Drucilla Bain, Florence Barrett, Carl Bartels, Everett Beneke, Marjorie Bolus, Thelma Bowan, Harry Burnett, Ray Cromwell, Villa Crowell, Christie Davis, Ole Davis, Naomi Durham, Mark Garnett, James Gunkel, Edgar Harris, Russell Hay, Jane Jessup, Ruth Kugele, Ruth Leffler, Martha Lloud, Betty Mathis, Bernard Matthews, Ruth Matthews, Fred McGinnis, Dane Prugh, Winthrop Richmond, Henry Rogowski, Sylvia Schauer, Ernest Sons, Miriam Kinner.

Following the initiation ceremony a banquet was held in honor of the new members. Dr. Stark of the Botany department gave an after dinner speech on "The Great God Pseudo Science."

Interesting illustrated lectures have been given by Dr. A. T. Evans of the Botany department and Dr. P. S. Crowell of the Zoology department. Dr. Evans spoke on "Gardens of the West," and Dr. Crowell on "Bird Banding."

Other off-campus authorities are also scheduled for future meetings to give a diversified and well rounded program for the year.

Hubert Bezdek, now a graduate student of Ohio State, last year won the award for doing the outstanding work in Biology. An award will also be given this year.

Roger Harned, *Corresponding Secretary.*

Phi—New Hampshire

President—Philip C. Harvey, Durham, N. H.
Vice-President—Hilda Batchelder, Durham, N. H.
Secretary—Wendell Pratt, Durham, N. H.
Treasurer—J. R. Thompson, Durham, N. H.

At the twenty-third initiation banquet on November 9, 1938, twenty new active members were initiated in to Phi chapter. These new members were as follows:

Faculty: Kenneth Anderson, graduate assistant, Bacteriology; F. Gaynor Evans, instructor, Zoology.

Graduate Students: Louisa Stuart, Carl Boothroyd, Richard Jones, Philip Couture.

Students: Paul Prince, Joseph L. Stone, Gordon Woolner, Sherman Ripley, Irving Shapiro, Joseph Tinker, Clyde Goodrum, Ernest Gould, Kenneth Kennison, Thomas Chretien, Carolyn Jackson, Frank Perron, Gordon Tower, John Archibald.

This number was one more than was taken in at this time last fall and was considered to be quite a good number.

Program for the initiation was as follows: Toastmaster, Dr. Leon Glover; address of welcome to new members, President, Philip Harvey; response for initiates, Frank Perron; speaker, Dean Jackson, "Spirit of Phi Sigma." Songs were sung during and after the meal.

On December 15, the annual Christmas party was held at the home of Dean F. Jackson.

The first meeting of the year was held on September 21. Work was outlined for the year and a vacation roll call found that many had attended school over the summer. We were surprised also to hear of the marriage of one of our faculty, Miss Ruth E. Thompson to Mr. Colby in late summer.

Other meetings so far this semester have been concerned with presentation of names, election of new members, pledging, and presentation of papers by members.

A fall outing was planned but because of the hurricane and the fire ban on the forest it was not carried out.

WENDELL PRATT, *Secretary.*

Chi—Montana State

President—Nolan Keil, Lewis Hall, Bozeman, Mont.
Vice-President—Ferne Wilson, 801 South 7th, Bozeman, Mont.
Secretary—Luella Hamilton, 1011 South Grande, Bozeman, Mont.

Chi chapter initiated the following, December 1: Samuel Cameron Litzenberger, Daisy Ellen Flick, Donald Kenneth Scharff.

Psi—University of Washington

President—Joe R. Goodman, 4511 20th N. E., Seattle, Wash.
Vice-President—Clifford Jay Burner, 1724 Hanford, Seattle, Wash.
Secretary—Ruth E. Coats, 123 Johnson Hall, University of Wash., Seattle.
Treasurer—Mrs. Harriet Smith Rucker, Physiology Hall, University of Washington, Seattle.

At the spring banquet on June 2nd, the following initiates were elected into membership: Mary Catherine Anderson, Benjamin Garrison Thompson, John H. Drew, Joseph Fischnaller, Harold Good, Dorotha Duff, and Dr. E. J. Ordal.

After the banquet and initiation ceremony, Dr. John E. Guberlet gave a talk on ''Research,'' and Dr. Hatch gave one on ''Obstacles to Research.''

The committee on the Phi Sigma Scholarship Medal Award was composed of Dr. Melville H. Hatch, Dr. Bror L. Grondal, Dr. George B. Rigg, Dr. Bernard S. Henry, Dr. James M. Dille, Dr. Earl R. Norris, and Dr. Charles E. Weaver. The medal was presented to Jackson S. Kiser, a member of the senior class in the department of Bacteriology, at the initiation banquet on December 8, 1938.

At the fall meeting on December 8, 1938, the following initiates were elected into membership: Sergio P. Acena, Minnie E. Andersen, Frances Bjorkman, Elizabeth L. Curtis, Walter W. Dalquest, John B. Glud, Max Katz, Clara J. Kelly, Don Lynn McKernan, Lucy Ann Novikov, Phillip

A. Olson, Dr. Elmer M. Plein, Herman E. Raskov, Roland V. Rethke, Harry E. Sovereign, Arthur W. Steers, and Paul A. Tornow.

After the banquet and initiation ceremony, Dr. James Dille welcomed the new members into the group. Dr. Belle A. Steven, one of the charter members of our chapter, gave a short but interesting talk on the history of our chapter. This meeting, being the tenth anniversary of the Christmas meeting, the active members were delighted that so many of the charter members were present.

Omega—Oklahoma

President—William Falkner, Botany Dept., Univ. Okla., Norman, Okla.
Vice-President—Elaine Walker, Zoology Dept., Univ. Okla., Norman, Okla.
Secretary—James Smith, Zoology Dept., Univ. Okla., Norman, Okla.
Treasurer—Paul Smith, Botany Dept., Univ. Okla., Norman, Okla.

The fall initiation banquet of Omega chapter was held Friday evening November 18, 1938 in the Union Building of the University of Oklahoma. The speaker of the evening was Dr. Charles A. Schull of the University of Chicago. Dr. Schull, who is at present guest professor at Oklohoma A. and M. College, Stillwater, Oklahoma, is a world authority on plant physiology and we consider ourselves very fortunate in having been able to secure him for that occasion. His lecture was on "The Effects of Radiations on Plant Growth."

There were nine new members initiated into the chapter.

Botany: Dorothy Henson, Ivan Rainwater, Merlin Van Valkenburgh.

Zoology: Elmo Bonifield, A. M. Brixey, Jr., Ava Lee Cox, Gerald Acker, Richard Goff.

Physiology: Luther Wallen.

JAMES M. SMITH, *Secretary.*

Alpha Alpha—Southern California

President—Nathan E. Carl, 1587 W. 45th St., Los Angeles, Calif.
Vice-President—Mrs. Ura T. Jensen, 1220 W. 30th St., Los Angeles, Calif.
Secretary—Elaine Adams, 9725 Regent St., Palms Sta., Los Angeles, Calif.
Treasurer—James L. Aiken, 5433 7th Ave., Los Angeles, Calif.

Dr. and Mrs. B. M. Harrison were hosts to Alpha Alpha chapter of Phi Sigma for the first meeting of the winter semester. The members related their varied experiences of the preceding summer. Many members toured through America, while several visited abroad. Dr. Robert L. Rutherford spoke on the Western United States and British Columbia and showed his collection of natural colored photographs of the area. Refreshments were served.

At the second meeting of the chapter, we were extremely fortunate in having Dr. S. J. Glass, endocrinologist from the Cedars of Lebanon Hospital and Hormone Assay Laboratories, speak to the group on the subject ''Sex-development: Normal and Abnormal.'' He indicated that masculinity and femininity were differences of degree and not of kind, and that sex reversal seemed to be based upon a linkage of heredity and hormonal differences. The talk was discussed at length.

The third meeting had for its speaker Mr. Francis Elmore. His topic was ''The Ethnobiology of the Navajo Indians.'' He presented a general summary of the Indian country, especially the Navajo country and the lecture was fully illustrated with slides, colored paintings of the animals and colored motion pictures of the Intertribal Indian Ceremonial held at Gallup.

Sincerely yours,
ELAINE ADAMS.

Alpha Epsilon—Pittsburgh

President—Dr. Wm. Starkey, 1001 Cathedral of Learning, Pittsburgh, Pa.
Vice-President—R. Dale Smith, 1001 Cathedral of Learning.
Corresponding Secretary—Dr. Edna Higbee, 1001 Cathedral of Learning.
Recording Secretary—Charles De Moise, 1401 Ashland St., Greensburg, Pa.
Treasurer—Olga Catizone, 1001 Cathedral of Learning.

Mr. Marcus Singer, recipient of our Phi Sigma Scholarship Medal received a Fellowship to the Zoology Department of Harvard University. We are all very proud of him and are hoping he will become an eminent Zoologist one of these days.

Dr. Warren Witz and Dr. George McKinley were made assistant professors of Biology.

A symposium on ''Recent Research In Endocrinology'' was presented Friday, November 4. The following took part: Dr. J. C. Donaldson, Department of Anatomy, School of Medicine; Dr. R. C. Grauer, Allegheny General Hospital; Dr. J. H. Leathem, College of Physicians and Surgeons, Columbia University; Dr. W. F. Starkey, Department of Biology; Mr. R. D. Smith, Department of Biology.

Alpha Beta—Mount Union

President—Cornell McFadden, Sigma Nu House, Union Ave., Alliance, Ohio.
Vice-President—I. Gene Austin, S. A. E. House, Union Ave., Alliance, Ohio.
Secretary—Elsie Jane Sanderson, Sebring, Ohio.
Recording Secretary—Ruth Scott, A. X. D. House, Alliance, Ohio.
Treasurer—Martha Smith, Elliott Hall, Alliance, Ohio.

Alpha Beta of Phi Sigma present the following new members initiated November 10, 1938: Dorothy Ayers, Sarah Doody, Mary Louise Oliver, James J. Sells, James Wildy.

The initiation meeting was held at the Sigma Nu house. Dr. Joseph M. Scott of the biology department of Mt. Union College read a paper on "The Versatility of Oliver Wendell Holmes." The banquet committee composed of Jane Dugan, Edwin Ross, and James Rutledge had charge of refreshments.

Alpha Beta held a dinner and meeting December 9, at Firestone Park, Columbiana, Ohio. Jane Dugan, as chairman, served a fine meal. After the dinner the society gathered itself in a semi-circle around the open fireplace, and the meeting proceeded.

Miss Betty Ayres gave a very appropriate account of her experiences while at Cornell University this summer. Dr. Joseph M. Scott and Mr. Donaldson presented a brief report of the convention of the Ohio Bacteriology Society which they and Miss Ayres attended at Cleveland, Ohio, December 2. Dr. Scott read some quotations from "Thrice a Stranger" by Vera Britton, also from Claude Bernard early French physiologist. Eleanor Imau, almuna member made several remarks concerning her teaching work.

Alpha Beta chapter is planning a joint meeting with the Akron chapter in the near future.

ELSIE JANE SANDERSON, *Corresp. Secretary.*

Alpha Zeta—William and Mary

President—Frank Kass, Williamsberg, Va.
Vice-President—Stewart Cotterman, Williamsberg, Va.
Secretary—Jean Snyder, Williamsberg, Va.
Treasurer—Prudence Searle, Williamsberg, Va.

This fall Alpha Zeta initiated the following into active membership: Bayler Bucher, Charles Cogliandro, Stewart Cotterman, Thomas Roy McCohill, Ellis Rueker Hsculty, Prudence Searle, John Tinsley.

On December 2, we had the pleasure of having Dr. Donald T. Ries of Utica, Illinois, with us. Dr. Ries is the naturalist of the Starved Rock

State Part of Illinois. He spoke to us on "The State Naturalist and State Parks of Illinois."

At a more recent meeting four of our new members told us about the activities of insectivoroses plants. Bayler Bucher reported on the bladder worts; John Tinsley, on the pitcher plant; Stewart Cotterman, on the sundew; and Prudence Searle on the Venus fly-trap. Each of the papers were followed by most interesting discussions.

We have made rather elaborate plans for the remainder of the year. These include informal discussions on topics which we hope will appeal to all of our members, field trips, visits to nearby institutions, and some outside speaker of public note. We hope all of them will prove to be both interesting and instructional.

JEAN SNYDER, *Secretary.*

Alpha Eta—Okahoma A. & M.

President—Robert Kaiser, Apiary Bldg., Okla. A. & M. College, Stillwater, Okla.
Vice-President—Herman Oakes, Horticulture Dept.
Secretary—Mary A. Bryan, 202 Husband St.
Treasurer—Bill Gorman, Aggie Halls, Okla. A. & M. College.

Alpha Eta chapter of Phi Sigma held its fall initiation banquet November 27, and the following persons were initiated: Charles Brown, Stephen Butler, Albert Crain, Lester Duck, Noma Dunn, Jeff Flowers, Wanona Henson, Karl Hetzel, Leroy Horn, Charles Hovey, L. J. Neese, Walter Stoneman, Harold Winters, Marvin Whitehead.

Following the banquet Dr. John Mizelle gave an interesting discussion of the "Reptiles of the United States." Following this Dr. Chas. A. Schull, guest professor of Botany from the University of Chicago, gave a delightful account of his impressions of our state and its problems.

ROBERT W. KAISER, *President.*

Alpha Theta—Washington State

President—Charles J. Campbell, 506 Colorady St., Pullman, Wash.
Vice-President—John Hardison, 1202 Maiden Lane, Pullman, Wash.
Secretary—Katharine Klise, 202 Spaulding St., Pullman, Wash.
Treasurer—James Mason, 504 Morton St., Pullman, Wash.

The following will be initiated by Alpha Theta chapter on Jan. 13: LaVeren Brugger, Roy Ole Burkland, Sylvan Irving Cohen, John H. Couch, Elmer James Davis, George Earl Davis, Errett Deck, Jr., Harold

Achilles Del Ponte, Fernley Willard Duey, Laraine Ernest Dunn, Elwood Buffington Fryer, Frank Burch Jaquith, Arthur Marois Jasmin, Carroll Glen Jorgensen, Norman Philip Knott, Bennie Lewis Leonard, William Steele Livingston, Margaret Elizabeth Martin, William R. Moore, Raleigh Moreland, Joseph Paul Olhava, Philip John Pfarr, James W. Stubbs, Martha Helen Thompson, Stanley Warren Walters, Homer Randall Wolfe.

Alpha Iota—Bucknell

President—Robert Griesemer, 232 N. 10 St., Reading, Pa.
Vice-President—George Sauer, 19 Lockhart St., Wilkes-Barre, Pa.
Secretary—Kenneth F. Herrold, Dept. Biol., Bucknell Univ., Lewisburg, Pa.
Treasurer—Jane Snyder, 1201 6th Ave., Altoona, Pa.
Advisor—Dr. W. H. Eyster, 130 13th St., Lewisburg, Pa.

It's been a long time since I was responsible for the Alpha Iota chapter news letter, so do not be too discouraged with the result. Our active members and pledges are all quite actively at work at this time of the year. To be exact, in the midst of their work, so that it would be unfair to state just where they are specifically; so for that reason I herein present a line sketch on each one as a chapter news note and with it a special article of interest from Dr. Norman H. Stewart, Chairman of the Department of Biology at Bucknell University.

Alpha Iota has held three very interesting meetings thus far this year. The first, the fall business meeting, the second, a picnic at the University Recreation Center for the prospective members, and the third, the "pledging" meeting which was attended by twenty-five members and guests at a dinner in the university dining hall.

The program at the second of these meetings was devoted to some real practical biology in the field. The latter was devoted to the witnessing of several reels of motion pictures on the development of anaesthesia.

Mr. Charles Mohr, Reading Museum of Natural History, will be the next speaker at the January meeting. He will speak on "Life In North American Caves." Mr. Charles Mohr is a graduate of Bucknell and a charter member of Phi Sigma. We were proud of Mr. Mohr's record while at Bucknell, but we are more proud of his nationally famous reputation as an authority on bats.

Mr. Robert Griesemer, president: Pursuing special studies in x-ray.

Mr. George Sauer, vice-president: In graduate study of paper milk bottles, as "safe" containers for milk.

Miss Jane Snyder, treasurer: Busy searching for the annual membership dues.

Mr. William B. Clemens: Teaching biology in Muncy, Pa. High School.

Mr. Alden Thompson, '38: Left Bucknell to attend Temple Medical School.

Mr. Stewart B. Kephart: University extended its dumping ground over his source of *Phagocata Gracilis,* no research until he finds his worm.

Mr. Edward F. Rabe: Soon to share his findings in a study of the effects of thyroxine, synthetic and dessicated, on the growth of tadpoles.

Mr. Cornelius Roughgarden: His question is one of mosquitos.

Miss Naomi Heritage: Assisting the university physician in his studies of *monilia* infections.

Pledges, thirteen: In the midst of their introduction to research. Their findings are yet unknown quantities, but cheerfulness is their constant quality.

KENNETH F. HERROLD, *Secretary.*

Alpha Kappa—Hunter

President—Irene Borek, 2199 Holland Ave., N. Y. C.
Vice-President—Mildred Spector, 1925 Harrison Ave., N. Y. C.
Secretary—Mildred Maisler, 1665 Townsend Ave., N. Y. C.
Treasurer—Anita Gaviss, 69 Buckley St., City Island, N. Y. C.

The following members have been initiated into our chapter of Phi Sigma on January 20, 1939: Miss Shirley Amkrant, Miss Mary E. Arnold, Miss Jessie Aronson, Miss Sophie Berck, Miss Shelia R. Berg, Miss Carol Elgart, Miss Renee Gluck, Miss Anne M. Hanson, Miss Leah Kuselowitz, Miss Blanche Lindauer, Miss Harriet Poller, Miss Sylva Risenstock, Miss Betty R. Talmadge, Miss Bernice Tarz.

MILDRED MAISLER, *Secretary.*

Alpha Lambda—Utah

President—Tyler A. Woolley, 575 Driggs Ave., Salt Lake City, Utah.
Vice-President—Albert W. Grundmann, 352 University St., Salt Lake City, Utah.
Secretary—Francis Swift, 1445 East 9th South, Salt Lake City, Utah.
Treasurer—Lonetta Johnson, 1204 Fenway Ave., Salt Lake City, Utah.

Alpha Mu—Oregon

President—Clara Chapman, Dept. Botany, Oregon St. College, Corvallis, Ore.
Vice-President—Dr. Alfred Taylor, Dept. Zoology, Oregon St. College, Corvallis, Ore.
Secretary—Stanley Jewett, Dept. Fish & Game, Oregon St. College, Corvallis, Ore.
Treasurer—George M. Hansen, Dept. Forestry, Oregon St. College, Corvallis, Ore.

December 7th, saw the initiation of the following: Le Roy Robert Hansen, Chai Hoon Kin, Tonini Margaret Lammi, Helen Shirley Lockren, Robert G. Rosenstiel, Maurice S. Tarshis.

AIO

Alpha Nu—New Mexico

President—Martin Fleck, 704 Ridgecrest Drive, Albuquerque, N.M.
Vice-President—Carolyn Miles, 1400 E. Roma Ave., Albuquerque, N.M.
Secretary—Elizabeth Gordon, 218 N. Maple St., Albuquerque, N.M.
Treasurer—Dixie Rae Boyd, K. K. Gamma House, Albuquerque, N.M.

The following entered Phi Sigma on December 15: Marion L. Davidson, David Henry Dudgeon, Robert Theodore Fincke, Miriam Roberta Higbee, Lela R. Koster, William J. Koster, Louise Lipp, Oscar Syme, William Wilson, Evert Albert Snyder.

Alpha Xi—Rhode Island State

President—S. Gilbert Blount, Jr., Beta Pi House, Kingston, R. I.
Vice-President—June Mac Knight, Chi Omega House, Kingston, R. I.
Secretary—Elizabeth Leon, Delta Zeta House, Kingston, R. I.
Treasurer—Victor Tkaco, Beta Phi House, Kingston, R. I.

Alpha Xi chapter has been more active than usual this year. Two talks have been given by members, "The History of Anatomy" by Rose Bishop, and "A General View of Insanity" by Edith Tallman. Informal discussions have also been held bi-weekly at our faculty adviser's professor Robert A. DeWolf, home. One of the subjects brought up for debate was "Does a Study of Biology Broaden One's Cultural Background?" Another subject was, "The Cell As the Unit of Function In the Body."

On December 8, initiation ceremonies were held, in which the following students were admitted to the society: Seniors—Vahey Paliegian and Frederick Pechhave; Juniors—John P. Barlow, Helen T. Edwards, Virginia F. Hornby, Alfred Jaffee, Benjamin R. Robinson, Louis D. Stringer, Robert W. Trescott, Jenry D. Weiss, and Natalie Whitford.

After the ceremonies Professor DeWolf and Dr. Harold W. Browning addressed the new initiates.

ELIZABETH LEON, *Secretary.*

Alpha Omicron—Marquette

President—James R. Neidhoefer, 1529 N. 51 St., Milwaukee, Wisconsin.
Vice-President—Frederick Adler, 928 S. 20 St., Milwaukee, Wisconsin.
Secretary—Robert E. Esser, 2021 S. Layton Blvd., Milwaukee, Wisconsin.
Treasurer—Charles G. Wilber, 1710 W. Highland Ave., Milwaukee, Wisconsin.

At the first meeting the year, Mr. Herman Karl, an assistant in the department of chemistry, spoke on the ''Possible Therapeutic Reactants of Cod Liver Oil.'' He said that cod liver oil had long been used by fishermen for the treating of wounds, frostbites, and skin lesions. Apparently, the results obtained attracted the attention of the medical profession, for some doctors began to treat patients with this oil. He outlined his own research problem on the effect of cod liver oil on the healing of wounds in the ear of the rabbit. The study of histological sections seems to support the view that the application of cod liver oil to wound surfaces promotes the process of repair and healing.

The members of the chapter and some thirty guests heard an invited speaker, Doctor Clement A. Fox, tell about developments in Neuro-Anatomy. Dr. Fox graduated from the College of Liberal Arts at Marquette, held a graduate assistantship in the Biology Department of Marquette for two years, and then in the Anatomy Department of the University of Michigan for three years. He is at present an assistant in anatomy at Marquette. A special feature of his talk was an account of his personal contact with some of the outstanding Neuro-Anatomists of the day. He showed lantern slides of Kappers, Herrick, Huber, Hill, Johnson and Crosby.

At the meeting of November 21, the following students were elected to membership: Marjorie Artus, Henry Becker, Joseph Mosovsky, Norman Olson, Paul Schmitt, Sister M. Thomasine, William Hyink. The initiation ceremony will take place on January 15, 1939.

This chapter will sponsor a Schleiden-Schwann Centennial program to commemorate the confirmation of the Cell-Theory. A public address will be given on Sunday afternoon of January 16 by the Reverend A. M. Schwitalla, S. J., Ph.D., LLD. Professor of Biology and director of the department, St. Louis University, St. Louis, Missouri. He will treat the history of the early concepts of a cell, trace the developments of the past one hundred years, and show the importance of the cell in modern cytology, genetics and medicine. Doctor W. N. Steil, Professor of Botany and director of the Biology department at Marquette will be the chairman of the meeting. Mr. James R. Neidhoefer, president of Alpha Omicron chapter will say a few words about the relation of Phi Sigma to the biological sciences.

Many of the members of this chapter are carrying on fruitful research problems. Mr. Charles G. Wilber is working on the histological structure of the skin glands of Amphibia. He has serial sections of skin taken from six species of frogs and toads. Mr. James R. Neidhoefer is continuing his work on the fresh water sponges. A second article has been accepted for publication. It will contain many original photographs and camera lucida drawings of the sponges and their spicules and gemmules. At present he is preparing serial sections for the difficult problem of determining the histological structure of these sponges. Mr. Robert E. Esser has been collecting the Fungi native to Wisconsin. He has lately begun a research problem involving the isolation of single spores from which he expects to grow mature forms.

Robert E. Esser, *Secretary.*

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BOOK REVIEWS

The thumbnail sketches of current biological literature appearing in this section are not meant to be exhaustive or deeply critical. They aim to survey the rapidly growing field of biology. Naturally these reviews represent the candid opinions of various readers not necessarily those of members of the National Council, nor even those of the Editor.

ADVENTURES IN RESPIRATION, YANDELL HENDERSON, *Williams and Wilkins Co., Baltimore, 1938. $3.00.*

The distinctly autobiographical tone of Dr. Henderson's work will not please the objective-minded among its readers. Nevertheless, the scientific position and the reputation of its author warrants more than passing attention to this interesting tale of a scientist's efforts to establish a theory of whose validity he was convinced. The work is well, almost profusely, documented, and offers one index of persons and another of subjects.

THE AGRICULTURAL AND HUNTING METHODS OF THE NAVAJO INDIANS, W. W. HILL, *Yale University Press, New Haven, 1938. $2.50.*

This, the eighteenth in the Yale University publications in Anthropology, maintains the uniformly high standard of the series. The care with which these studies are being carried out, the wise choice of vanishing, or near-vanishing Indian cultures which are being exhaustively studied, makes this a valuable contribution to anthropology, as well as fascinating reading. We Americans have had a lot of pseudo-Indian stories foisted on us by imaginative or poetical interpreters of the aboriginal mind. It is refreshing to find the real thing in scientific literature.

ALASKA WILD FLOWERS, ADA WHITE SHARPLES, *Stanford University Press, Stanford University, California, 1938. $3.00.*

Very few people are aware of the profusion and variety of the floral life of the Alaskan peninsula. As a fascinating picture of the extent of these plant offerings this book is worth owning. Each two facing pages of text is followed by two others, each with two photographs of Alaskan flowers taken in their natural habitat. These are most attractively gotten together, and are, on the whole, quite as useful for diagnostic purposes as many of the illustrations found in most local floras. About the only weakness in the book is the lack of a key, and of sufficient documentation to establish the forms described.

ALGAE, THE GRASS OF MANY WATERS, LEWIS HANFORD TIFFANY, CHARLES C. THOMAS, *Springfield, Ill., 1938. $3.50.*

This slim little volume offers so much that is valuable as a survey of the algal kingdom that it should be in every high school and public library. The photographs are new and effective, the diagrams are not so complex as to be confusing, the style is perhaps the most attractive feature of the work. It is vibrantly fresh, almost to the point of gaiety. There is nothing in botanical literature that quite compares with it.—On second thought, this should be an excellent work for one of the new survey courses which are becoming so popular in the modern college program.

AMERICAN ANIMAL BOOK, PHILIP L. MARTIN, ALFRED A. KNOPF, *New York, 1938. $1.75.*

Thirty-three poster-style illustrations of American wild animals in five colors. Outside of the titles on each page there is not a single word of printing, descriptive matter or otherwise in the body of the book. It is quite the simplest production we have yet seen. The habitats of the animals are well, if somewhat impressionistically, blocked in.

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THE ANATOMY OF THE DOMESTIC ANIMALS, SEPTIMUS SISSON REV. BY J. D. DANIELS, *3rd ed., W. B. Saunders Co., Philadelphia, 1938. $12.00.*

Exhaustively covering the anatomy of horses, cattle, sheep, swine and dogs, this textbook should be in every university and college library. Originally written as a veterinary text the usefulness of this volume extends to the whole field of mammalian anatomy. Profusely illustrated with illustrations as critically accurate as the best found in human anatomy text-books, the book is worth every cent asked for it to the zoologist. To the veterinary student it is invaluable.

ANIMAL LIFE IN FRESH WATER, HELEN MELLANBY, *Chemical Publishing Co. of N. Y., Inc., New York, 1938. $3.50.*

Originally published in Scotland, the agency for this work has been taken over by the Chemical Publishing Co. The book is a handy manual for those who like to identify general types as they go afield. The illustrations are all very clear, no photographs being used. The descriptions being all that can be desired for the British forms under consideration. The book is closely cross-referenced to Ward and Whipples well-known "Freshwater Biology," which should make it a helpful manual for invertebrate classes.

ANIMAL NEIGHBORS OF THE COUNTRYSIDE, JOSEPH WHARTON LIPPINCOTT, *J. B. Lippincott Co., Philadelphia, 1938. $2.50.*

This is natural history with a difference. The author goes about his nature observing with an eye to the possibility of making some new contribution to scientific research. Based on observations over a fifty acre farm, there are few of the more common mammals, birds and reptiles that have been missed, with, perhaps, the exception of the insects. Lynn Bogue Hunt contributes forty-three line etchings very much in keeping with the spirit of the work. Altogether this is a work that would be good to put on your holiday gift list for the outdoor man, woman or child.

ANIMALS OF THE SEASHORE, HORACE G. RICHARDS, *Bruce Humphries, Inc., Boston, 1938. $3.00.*

Here is a thoroughly scientific manual of marine invertebrates for those who delight to roam the Jersey shores in an inquiring frame of mind. It is well illustrated, briefly but clearly descriptive, and of just the right size to slip into a ruck-sack or a capacious pocket. It will be handy in the laboratory or library, too.

ANIMALS WITHOUT BACKBONES, RALPH BUCHSBAUM, *University of Chicago Press, Chicago, 1938. $3.75.*

A new all-time "high" in the production of an invertebrate zoology text has been reached in the appearance of the long-awaited Ralph Buchsbaum contribution to the general introductory courses, which have become the University of Chicago's contribution to undergraduate education. The diagrams and sketches are unparalleled for clarity. The text is intelligently and interestingly organized. The photographs are lavish, both in number and in detail. All in all, this book is so far ahead of the others in its field that it will be the pacemaker for years to come. It belongs very definitely in the "must" category for all zoologists.

BACTERIOLOGY, E. D. AND R. E. BUCHANAN, *The Macmillan Co., New York, 1938. $3.50.*

This fourth edition of a textbook on bacteriology for students in general and household sciences is too well and favorably known to need extensive review here. As a manual for a survey, or beginner's course in non-pathologic bacteriology it leaves very little to be desired.

THE BEHAVIOR OF ORGANISMS, B. F. SKINNER, *D. Appleton-Century Co., New York, 1938. $5.00*

This experimental analysis of the field of behavior represents the culmination of a long series of experiments so objectively reported and correlated that it forms an invaluable reference work for the psychologist primarily, although it should be of considerably more than valuable aid to the student of animal behavior. Let no inexperienced youngster think that this complete and exhaustive treatise is going to be a "snap" reference. It is even for the psychologist, not always plain sailing. That it is, however, as plain as it is in a day of muddled psychological thinking, is to the author's everlasting credit. No psychological library can go long without this book.

BIG FLEAS HAVE LITTLE FLEAS, Robert Hegner, *The Williams and Wilkins Co., Baltimore, 1938. $3.00.*

That a book may be simultaneously interesting and scientifically accurate has been amply proven by past productions from the pen of Johns Hopkins University's professor of protozoology. This new work caps every previous literary and scientific success of Robert Hegner. Not only is the story of the protozoa told with all that charming lucidity which is his particular contribution to scientific literature, but the illustrations are something to enjoy as well as profit by. There are many photographs of protozoan preparations, and of the author's tropical field trips. What distinguishes this unique work from all modern works of its kind is the liberal use the author makes of sometimes serious, more often, humorous, pen-sketches both as marginal and text embellishments. There is a bibliography and a glossary. Another "must" book for your list.

BIG TREES, Walter Fry & John R. White, *Stanford University Press, Stanford University, California, 1938. $1.50.*

This is the revised edition of a handbook to the sequoia groves of the west slopes of the Sierra Nevadas. It first appeared in 1930, went through three printings, and now comes out attractively in its revised form. Whether one has visited, or intends to visit the Sequoia National Park or not, this is an interesting and thought provoking work. It should be in every library, dealing as it does with the discovery, age, nature, dimensions, and history of the forest and its gigantic specimens, the largest and oldest living things on earth.

BIOCHEMISTRY, Benjamin Harrow, *W. B. Saunders Co., Philadelphia, 1938. $3.75.*

This biochemical text for students in medicine, dentistry and the general college is the most compact collection of material on the subject which has yet to cross this reviewer's desk. Less than four hundred pages in length, adequately illustrated with sketches, charts and diagrams, and with really intelligent and compendious bibliographies, this should be an excellent adjunct to the biochemical lecture and laboratory course.

BIOGRAPHY OF THE UNBORN, Margaret Shea Gilbert, *The Williams and Wilkins Co., Baltimore, 1938. $1.75.*

There is no phase of human existence more shrouded in a mist of mystery and superstition than the nine month period of gestation which precedes childbirth. There has, it is true, been quite a flood of literature in recent years aiming to explain away the superstition by lifting the veil of mystery. Both, like most racial fixations, still persist. While the factual matter in the present work is not much of it new, there is plenty of room on our public library shelves for such a work. It will be handy for the physician to loan to the inquiring and intelligent couple who are expecting the first addition to their family circle. There are a few questions it does not answer, however. Most people will turn to the explanation on twinning in vain if they are seeking an explanation for triplets, or even quintuplets.

A BOOK OF BIRDS, Mary Priestley, *The Macmillan Co., New York, 1938. $2.50.*

This book is a bit of a puzzler. It is so radically different from anything anyone has yet attempted that one doesn't quite know how to take it. The more you dip into it, however, the better you like it, and you finally lay it down wondering why no one seems to have tried this sort of thing before. Briefly, it is a bird student and lover's scrap-book, a sort of anthology on birds. Much of the information is purely old-fashioned natural history, some of it is of ecological value, all of it interesting. A good gift book, it will find a merited place on public and high-school library shelves under the label of British birds.

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THE BOOK OF INSECT ODDITIES, R. L. DITMARS, *J. B. Lippincott Co., Philadelphia, 1938. $2.00.*

Put this one down on your Christmas gift list as No. 1, for the I. Y. (inquiring youngster). Of course you will read it yourself, and then pass it on with a twinge of regret that you can't keep it yourself. Of course it's not a piece of graduate research, but it's intelligently written, and has the blessed virtue of not talking down to a youngster. As for illustrations, well, the book actually glows like a piece of brilliantly figured chintz. (Query: Why doesn't some enterprizing print manufacturer look here for inspiration and designs?)

THE CALIFORNIA WOODPECKER AND I, WILLIAM EMERSON RITTER, *University of California Press, Berkeley, 1938. $3.50.*

The author, who may well be rated as one of the deans of California biology, frankly and whimsically begins his work with a subtitle, "A study in comparative zoology, in which are set forth numerous facts and reflections by one of us about both of us." With such an introduction, and the very serious apostrophe to the importance of the moral law in the web of life with which the volume's last chapter ends, one might expect to find not a little zoology, and considerable personal philosophy in the book. Nor will one be disappointed. Here is a work, personal, pungent at times, and always interesting. The position of the author, and his long life devoted to biological research, warrant every bit of the attention these reflections of his maturer years have been receiving since their publication.

THE CHEMICAL ANALYSIS OF FOODS AND FOOD PRODUCTS, MORRIS B. JACOBS, *D. Van Nostrand Co., New York, 1938.*

Covering what appears to the ordinary biologist an extraordinary range of foodstuffs, this compendious manual will be a distinct asset to food purity experts, to dieticians, and to biochemists in general. The methods are as simple as practicable, and should be within the range of ordinarily adequate laboratory equipment. As such it will be useful in federal, state, and commercial laboratories as well as in educational institutions.

COMMERCIAL FERTILIZERS, GILBEART H. COLLINGS, *P. Blakiston's Son & Co., Philadelphia, 1938. $4.00.*

This is the second edition of a useful textbook which first appeared four years ago. Much of the original work has been completely rewritten, the bibliography has been generously expanded, and a new chapter has been added dealing with the newer techniques of adjusting soil reaction and fertilizer practice to crop requirement. For the student of soils, be he in college, or on the farm-campus, this should be a helpful text or reference for consultation.

THE CULTURE OF ORGANS, ALEXIS CARREL AND CHARLES LINDBERGH, *Paul B. Hoeber, New York, 1938.*

So much publicity was given last winter to the mechanical heart invented by Dr. Carrel and Mr. Lindbergh that many biologists became exceedingly skeptical about the whole business and deferred their judgment in the matter until the scientific press came forth with more accurate and objective accounts of this new piece of apparatus. Now that the distinguished collaborators have published the results of their joint labors, we are given an opportunity to judge for ourselves. It would be very temerarious for anyone not to be impressed by the tremendous possibilities opened up by this new departure. When tissue culture was announced a few years back it was thought that the limits of scientific maintenance of life outside the organism had been reached. Now whole organs are being pure-cultured, and the results of such studies are beyond speculation.

DISEASES OF THE SMALL DOMESTIC ANIMALS, OSCAR VICTOR BRUMLEY, *Lea & Febiger, Philadelphia, 1938. $4.75.*

This is the third edition of a well-known text for students and practitioners in veterinary science. In practically every case the discussion of each diseased condition is summarized briefly but clearly under the following heads: definition, occurrence, etiology, pathology, symptoms, course, diagnosis, prognosis, and treatment. For those who are not professionally concerned but for those amateur raisers of pets who have considerable experience the book might prove helpful.

ESSENTIALS OF BIOLOGY, W. H. D. Meier and L. M. Shoemaker, *Ginn and Co., Boston, 1938. $1.80.*

Here is a new edition of a standard high-school biology text which looks as though it might prove both practical and easy to teach. It has many and well-chosen illustrations, and is well illustrated. Since it is a new edition one is somewhat disappointed not to find any mention of chemical culture of plants, a recent development of the last two years which should challenge the interest of high-school students.

FERNS OF THE SOUTHEASTERN STATES, John Kunkel Small, *The Science Press, Lancaster, Pa., 1938. $3.50.*

The late, lamented John Kunkel Small was a pteridologist *par excellence.* More than one volume of his favorite plant forms came from his pen, this last being a posthumus publication. Those who know his previous publications, and who are interested in the ferns of that whole region which stretches from the Mason and Dixon line to the Rio Grande, will want to have this book. It is a good 500 pages of investment with illustrations of a clarity that one has always associated with John Kunkel Small's work.

FIELD BOOK OF FRESH-WATER FISHES OF NORTH AMERICA, Ray Schrenkeisen, *G. P. Putnam's Sons, New York, 1938. $3.50.*

Putnam's Nature Field Books have been long and favorably known guides for outdoor folk who want scientific accuracy with convenient portability. To this distinguished group of field companions comes the last work of the late editor of "Field and Stream". Perhaps no one was a more enthusiastic specialist in our American fresh-water fishes than Ray Schrenkeisen. This work, therefore, was to him a labor of love, cut short by his untimely death. The book was completed by J. T. Nichols and F. R. LaMonte of the American Museum of Natural History. Uniform in size and binding with the rest of the series, it is a convenient and handy volume which a lot of sportsmen and women would welcome, even as much as professional biologists.

FIELD GUIDE TO NEW ENGLAND TURTLES, Harold L. Babcock, *New England Museum of Natural History, Boston, 1938.*

What on first view looks like some ordinary pamphlet, turns out on closer inspection of this work, to be a very compact pocket manual, bound in paper, of new England turtles, all of which are illustrated *in color!*

FLORA HAWAIIENSIS, Otto Degener, *published by the Author, 2220 University Avenue, Honululu, Vol. I (1933), Vol. II (1935), Vol. III (1938), $3.50 each.*

This is a unique set of taxonomic works, dealing as it does with the plants of the Hawaiian Islands. The volumes are gotten up after the loose-leaf fashion of one of these new replaceable encyclopedias. Each page bears on its first side a description of the species under discussion, on its reverse a very clear sketch from life. The first volume contains 336 pages and 107 plates, the second 316 pages and 102 plates, the third 310 pages and 123 plates. A fourth volume is in course of preparation. Anyone who is interested in the flora of the Pacific coast, or the islands, will need and want to have this interesting series of books.

FLOWERING PLANTS AND VEGETATION, Charles J. Lyon, *(published by the author), Dartmouth College, Hanover, N. H., 1938. $3.25.*

Every once in a blue moon a new type of textbook appears which blazes a new trail through a well trodden scientific field. Sometimes the trail ends suddenly,—the author has uncovered no new or significant approaches to the old facts and theories. Sometimes the trail continues on and on indefinitely,—the author has made a real contribution to the technique of teaching his subject. Whether or not Dr. Lyons' newly revised textbook belongs to the first or second category remains to be seen. There is no question that he had blazed a new trail.

He has attempted to build a course around the living plants available during the second semester of the academic year in northern schools. He has omitted much of the cytology, the life histories, and minute anatomy which characterize most beginning texts, and confined his attention to the more ecological and conservational aspects of a survey course. The book lacks an index, a defect perhaps due to its experimental nature, and easily remedied when the change from planographed to printed book is made.

FOREST NEIGHBORS, Edith M. Patch and Carroll Lane Fenton, *The Macmillan Co., New York, 1938, $1.50.*

Anthropomorphic stories of incidents in the lives of forest animals make up this interesting children's book which should be added to the grade school library. It has a real value not to be found in many school story-books, in that there is a wealth of interesting suggestions toward side-line study or reading. The authors are not content to merely recreate the lives of wild things in human terms,—they bring in all sorts of stimulating questions, references to other nature books, botanical and ecological subjects for further study. Youngsters who read these books will be impelled to expand their knowledge on nature, and of living things.

FOREST PATHOLOGY, John Shaw Boyce, *McGraw-Hill Book Co., New York, 1938. $5.00.*

The American Forestry series which the publishers of this new text are sponsoring, is richer by another valuable manual on pathological problems as they affect our decorative, fruit and timber trees. We have long needed just such a work as this which might embody all the most recent research and discoveries in this crucial field. Dr. Boyce has arranged his treatment of tree diseases in line with the part affected, seedlings, roots, stems, foliage and fruit. There is also a section devoted to rots, decay and staining, and the control of forest diseases. While the text will be invaluable for forest pathology classes, we venture to suggest that it will be found on the shelves of most practical foresters, nurserymen and park custodians, and deservedly so.

THE FOUNDATIONS OF SCIENCE, H. Poincare, *The Science Press, New York, 1929. $5.00.*

The position of Henri Poincare in non-Euclidean geometry is definitely assured. This authorized version of his outstanding contribution three phases of the subject, science and hypothesis, the value of science, and science and method, cover a wide range in the field of scientific philosophy. That the book deals chiefly with mathematics, logic, physics, chemistry and to a small extent with geology, should not minimize its importance to the biological student whose biophysical and biochemical contacts, not to say anything of statistical calculations, bring him sometimes violently into mathematical mysteries of which he all too frequently knows next to nothing. The results are sometimes tragic, and certainly no credit to biological research.

GENERAL ZOOLOGY, H. L. Wieman, *McGraw-Hill Book Co., New York, 1938. $3.50.*

An almost complete rewriting of another well-known standard textbook results in a third edition of Wieman's General Zoology. The introductory chapters have been enlarged in order to give more attention to structures and functions in the frog which is used as the first type specimen. A technique which is more common to comparative zoology has been introduced in the correlation of functions with structures wherever possible. All in all, these changes of such a forward-looking character should make this textbook even more acceptable to those who have been using it, and should make new friends for it.

GENETICS, Herbert E. Walter, *The Macmillan Co., New York, 1938. $3.00.*

Twenty-five years ago the first "Genetics" by H. E. Walter appeared and won instant approval by reason of the unexpected clarity and sanity with which the author had treated what was then a rather hopelessly muddled subject. Genetics then was still in its swaddling clothes, DeVries, Correns and Tschermak had rediscovered Mendel's original research only thirteen years before, and the science of heredity was still on the educational horizon. Now, after the expiration of a quarter century of use, the Walter text appears in an almost completely rewritten fourth edition, beautifully gotten up in new type, new covers, illustrations, extensive appendices, and a glossary. Just why the various editions of this invaluable text have maintained its popularity is not hard to understand. The author has kept the introductory nature of the book constantly before his eyes, he has not attempted to overawe the beginning student either with statistics or with complicated developments in his chosen field. He has therefore maintained and will undoubtedly continue to maintain, a unique position in the field of genetic literature.

THE GENUS SEPTOBASIDIUM, JOHN N. COUCH, *University of North Carolina Press, Chapel Hill N. C., 1938. $5.00.*

The peculiar fungal genus Septobasidium which parasitizes Aspidotus asborni, one of the more common southern scale insects is here made the subject of an extensive and interesting study. It is also known to attack many different varieties of trees directly, largely those, however, which are infected by the nineteen different scale insects. As an example of a curious fungal-insect relationship it will be of interest both to entomologists and to mycologists as well.

GLACIAL HISTORY OF THE STREAMS OF SOUTHEASTERN MICHIGAN, JAMES WILLIAM BAY, *Cranbrook Institute of Science, Bloomfield Hills, Mich., 1938.*

The area which lies to the west of Lake Erie, the Detroit River and Lake St. Clair has an interesting geological history. It is here readably and intelligibly detailed for those whose geological and biological interests in the area make this knowledge desirable. We do not have enough of these local studies, accurately done, particularly in regard to the effect of the glaciations in producing the present land contours.

HANDBOOK OF HISTOLOGICAL AND CYTOLOGICAL TECHNIQUE, R. R. BENSLEY AND S. H. BENSLEY, *The University of Chicago Press, Chicago, 1938. $2.00.*

Here is something decidedly new in laboratory manual for histology and cytology. In format it is a stout 9 by 11 inch binder containing 168 very legibly printed,—not planographed,—pages, with an internal metal strap binding which permits every page to lie open, absolutely flat. The material is divided into two sections, five chapters being devoted to techniques for the study of fresh tissues, chapters six to twenty-one dealing with fixed tissues. The techniques are described in detail, and plenty of space is left at the end of each chapter for the student's notes, additions, etc. In addition to specific references to special techniques which occur in the text, there is an adequate bibliography of standard references at the end of the manual. A good index completes the work, which will repay study and consideration.

HANDBOOK FOR SHELL COLLECTORS, WALTER FREEMAN WEBB, *202 Westminister Rd, Rochester, N. Y. 1936. $2.50.*

This is one of those intelligently planned catalogs of specimens for sale which is something much more than an ordinary price-list. In the first place, it is profusely illustrated. Secondly, the author makes no pretensions of issuing a key to shell classification. He has grouped his offerings according to sources,—the East and the West Coast marine shells, then the marine univalves and bivalves, the terrestrial helicoids and operculates, with a series of final groups which include the land shells from spots all over the world, the United States land forms, and a collection of dried marine invertebrates. Museum and laboratory collectors will want this book.

THE 1937-1938 HARVEY SOCIETY LECTURES, THE WILLIAMS & WILKINS CO., *Baltimore, 1938. $4.*00

This 33rd volume of the famous Harvey lecture contains the research papers presented by Drs. Selig Hecht, Einar Lundsgaard, Cecil K. Drinker, John P. Peters, Philip Bard, Wendell M. Stanley, F. C. Koch and Harry Goldblatt. For outstanding research in the fields pertaining or related to medicine hardly anything more authoritative appears each year than these Harvey lectures.

THE HEALING KNIFE, George Sava; *Harcourt, Brace and Company, New York, 1938. $2.50.*

One of the most fascinating autobiographies in recent years. The author, for obvious reasons, writes under a pseudonym. His story begins with his experiences in the White Army at the end of the world war. It ends with him established in his present medical profession in London. Between the two lie the events of a checquered career, a vivid personality, a fascinating story.

HERBALS, Agnes Arber, Cambridge at the University Press, *The Macmillan Co., New York, 1938. $7.50.*

This is the second and enlarged edition of Agnes Arber's famous work on the "Herbals, their Origin and Evolution." Ever since the first edition appeared in 1912 a new standard was set in publications dealing with the history of the sciences. This revised edition will materially raise that standard. Scientists who are interested in the history of their craft, not merely botanists alone, will want to own a copy for themselves. Many new illustrations have been added, some chapters have been expanded, and the bibliography considerably extended. No college library can afford to be without this really significant work.

A HISTORY OF DENTISTRY, Arthur Ward Lufkin, *Lea & Febiger, Philadelphia, 1938. $2.75.*

A gap in our scientific history has at last been filled and that most charmingly in the publication of this new history of dentistry. Beginning with the dentition of prehistoric man, and coming down through the ages, the author traces the rise of modern dentistry, and ends his absorbing story with some arresting considerations affecting the problems of modern dentistry. As one lays the book down, the first thought that comes to mind is "Why hasn't someone done this before now?" And the second thought is somewhat akin to it, "Will modern dental medicine accept the challenge the author offers in his concluding lines: 'Let us go to the ignorant savage, consider his ways of eating and be wise. Let us cease pretending that toothbrushes and toothpaste are any more important than shoe brushes and shoe polish. It is store food that has given us store teeth.' "

THE HUMAN ORGANISM AND THE WORLD OF LIFE, Clarence W. Young, Clarence J. Hylander and G. Ledyard Stebbins, *Harper and Brothers, New York, 1938. $3.00.*

Here is a book somewhat out of the ordinary. It has been aborning for the last ten years as the result of the joint labors of members of the Biological Survey at Colgate University. Subject matter is considered under three main heads,—maintenance and survival, reproduction, inheritance and heredity, behavior and mental activity. Under each of these divisions there is an interesting array of chapter subdivisions, but the most unusual feature of the book is that it includes human as well as animal and plant structures and functions wherever possible as a unit. The book is difficult to place according to older and more traditional standards, but who knows whether or not this forward-looking group of teachers may, as we say, "have something here?" It will repay an interested study.

INDEX TO NORTH AMERICAN FERNS, Maurice Broun, *Route 1, Orwigsburg, Pa., 1938. $2.50.*

In a much muddled and indecisive synonymy regarding the ferns, it is a relief for the taxonomist to discover a really practical handbook such as this new offering. It is a check list of all the known American ferns, together with their habitat range, the various synonymous terms applied to them, and the original reference in which the term appeared. This book will be an invaluable addition and adjunct to the systematic library,—one that can hardly be done without.

THE INSECTS OF NORTH CAROLINA, C. S. Brimley, *Division of Entomology, N. C. Dept. of Agriculture, Raleigh, 1938.*

Some time prior to 1902 a card catalogue of the insects of North Carolina was started in the state department of agriculture at Raleigh, North Carolina. Under varying superintendence it has grown to cover some 9,566 specimen forms and records of their appearance in the state. For the entomologist this work will be of primary interest, but ecologists, zoologists in general, and field workers will find it valuable, not merely for the records of the insect appearance, but also for geographical spread, and months of seasonal dominance.

IN THE NAME OF COMMON SENSE, MATTHEW N. CHAPPELL, *The Macmillan Company, New York, 1938. $1.75.*

Here is a gay, and philosophical, albeit psychological study of one of the worst of civilization's enemies, Worry. The author analyzes the kinds of worry and its various types, shows how baseless they are, and offers some commonsense prophylaxis. An ideal holiday gift for your worrying friend, but it probably won't do him any good anyway so keep the book for yourself.

AN INTRODUCTION TO BOTANY, ARTHUR W. HAUPT, *McGraw-Hill Book Co., New York, 1938. $3.00.*

Instructors and institutions which are looking for a compact, well-organized botanical textbook for a one-semester course, would do well to examine this new Haupt manual carefully. It adheres to the more or less traditional method of presenting gross plant anatomy and physiology first, followed by a survey of the plant kingdom. It will not take much more than a superficial examination to reveal how teachable this work really should be. There is a profusion of really new and fresh illustrations, even the diagrammatic sketches being for the most part original. The chapters on environment and heredity are particularly well done.

AN INTRODUCTION TO VERTEBRATE ANATOMY, HAROLD MADISON MESSER, *The Macmillan Co., New York, 1938. $3.50.*

So many of the better textbooks which periodically appear in the scholastic book market seem to be designed for whole year courses that it is refreshing to find an adequate new offering that envisions a single semester course. Such a very desirable volume is this new introductory volume for comparative vertebrate anatomy. It is well illustrated, indexed, has a good bibliography of standard references, and a sixteen page glossary. It should fill a much needed function in our biological teaching.

AN INTRODUCTION TO HUMAN PHYSIOLOGY, LATHAN A. CRANDALL, *W. B. Saunders Company, Philadelphia, 1938. $2.00.*

This second edition of a human physiology which has proved its utility by its popularity, has an added glossary, and chapters on the cell, general physiology, and the properties of living matter.

AN INTRODUCTION TO THE VERTEBRATES, LEVERETT ALLEN ADAMS, *John Wiley & Sons, New York, 1938. $3.50.*

This new addition of Adams' text has been long awaited, and the waiting has not been in vain. The text is well organized, freshly illustrated, and enriched by a new device which is worthy of separate comment. This is the resume at the end of each chapter. This, to your reviewer, is a most worthwhile device. We look for summary or abstract at the end of every piece of published research, why should we not expect it in our text books. It is a novel idea and should go far to popularize the book.

INTRODUCTION TO METHODS IN EXPERIMENTAL PSYCHOLOGY, M. A. TINKER AND K. H. BAKER, *D. Appleton-Century Co., New York, 1938. $2.75.*

Experimental psychology teachers and students should be absolutely sure to examine this new laboratory notebook. It is most novel and practical in its get up. It consists of a set of pressboard covers within which are the laboratory note-book sheets, all held together by the customary spiral binding-wire. The notebook sheets, however, are perforated, and can be detached for turning in to the instructor for correction. After they have been returned they can be kept within the present covers with five ordinary notebook rings. There are some 28 experiments, for which charts, diagrams, and coordinate paper are conveniently provided. One could hardly conceive of a more effective or novel a set up to avoid what the authors realistically refer to as "the pedagogical sin of devoting the classroom periods entirely to 'talk.'"

KAZAK SOCIAL STRUCTURE, Alfred E. Hudson, *Yale University Press, New Haven, 1938. $1.50.*

The results of a summer's work spent among the Turco-Mongol tribe known as the Kazak (Kirghiz) who inhabit the region extending eastward from the north shores of the Caspian Sea, past the Aral Sea, to beyond the Zetish River and Lake Balkash, are here discussed under the headings social economic groups, family and marriage, class stratification, political groupings and inter-group relations. There is also an interesting chapter on the development of Mongo social structure.

KEY TO THE OUT-OF-DOORS, Richard James Hurley, *The H. W. Wilson Co., New York, 1938. $2.50.*

This is purely and simply a bibliography of American popular nature-study material on the sky, weather, rocks and minerals, plants, trees, insects, fish, birds, reptiles, amphibia and animals. There are also chapters on general materials, magazines, lantern slides, nature devices and supplies, and an address list. The book will be helpful to librarians, and teachers of nature study.

A LABORATORY AND FIELD GUIDE TO BIOLOGY, Samuel H. Williams, *The Macmillan Co., New York, 1938. $1.25.*

Something new in laboratory manuals appears in this little pocket-size book by the author of "The Living World," a biology textbook which appeared last year. It consists of some sixty-five exercises devoted to as many types, groups or habitats of living forms. The only trouble with a book like this is that it gives the reader the itch to get out of doors and to go places and see things. Which is rank heresy as far as most of our modern laboratory courses are concerned. More power to Dr. Williams and his books.

LABORATORY DIRECTIONS FOR COMPARATIVE ANATOMY, Irving E. Gray, *P. Blakiston's Son & Co., Philadelphia, 1938. $1.00.*

This is a laboratory manual for students who are expected to do their own work with a minimum of assistance (or annoyance?) from the instructor. It opens with a brief survey of the vertebrates and then gets down to business on the comparative skeletal systems, followed in turn by the muscular systems, the digestive and respiratory systems, the circulatory system, the urogenital system, and the nervous system. A careful study of the work leads one to think that it will be unusually effective.

A LABORATORY GUIDE FOR A COURSE IN GENERAL BOTANY, L. Bonar, L. Roush, and R. Holman, *John Wiley & Sons, New York, 1938. $1.25.*

This fourth edition of the laboratory manual designed to accompany Holman and Robbins' well-known textbook of general botany, needs no introduction to the botanical teaching profession. The manual is planned for a year's course of two weekly laboratory periods. It is worthy of investigation by prospective teachers and assistants in general botany courses.

A LABORATORY MANUAL OF GENERAL BIOLOGY, E. Grace White, *The C. V. Mosby Co., St. Louis, 1938. $1.50.*

This is the second edition of a laboratory manual designed to accompany the author's "Textbook of General Biology." It is gotten up in the laboratory notebook style, with punched sheets for insertion in a set of standard notebook covers. The material for student study is more than ample, and should keep the average class thoroughly busy.

LABORATORY MANUAL OF GENERAL PHYSIOLOGY, P. H. Mitchell and I. R. Taylor, *McGraw-Hill Book Co., New York, 1938. $1.50.*

At last we have a laboratory manual to accompany Dr. Mitchell's excellent general text on physiology. Some two hundred and fifty-four experiments are outlined, with directions, and, occasionally, much needed explanatory illustrations. Naturally not all the experiments will be necessary, or need to be performed. It is intended that the supply will exceed the demand so that sufficient leeway will be afforded the instructor in choosing his demonstration or laboratory material to meet the needs of his course, his students, or be compatible with the equipment or material at hand.

LIFE, HEAT AND ALTITUDE, David Bruce Dill, *Harvard University Press, Cambridge, 1938. $2.50.*

The very chapter topics of this unusually interesting work on the physiological effects of hot climates and great heights from the Fatigue Laboratory of Harvard University is, to use an overworked term, "intriguing." These topics are: energy exchange and environment, perspiration, thirst, man in hot climates, animal life in deserts, animal life in great heights, man in high altitudes, high altitude flight. The author has a distinct literary style, writes at the level of the ordinarily well-educated layman, but has a mine of information for the traveller, mountain climber and those who scale the heights of the atmosphere in airships and aeroplanes.

LIFE IN AN AIR CASTLE, Frank M. Chapman, *D. Appleton-Century Co., New York, 1938. $3.00.*

Unfortunate the biologist who has not made contact with some fellow student who has spent a portion of his time on Barro Colorado, that fascinating island formed of a hill-top by the filling in of Gatun Lake, along the route of the Panama Canal. The island has been placed by the government in the direct care of the Institute for Research in Tropical America. Here the Institute maintains its tropical laboratory and residences, and to this spot frequently goes Dr. Frank M. Chapman, Curator of Birds in the American Museum of Natural History. The records of one such trip are here graphically summarized, not only in descriptive writing in the author's usual interesting style, but also by sketches and over fifty photographs.

THE LIFE OF CHEVALIER JACKSON, AN AUTOBIOGRAPHY, *The Macmillan Co., New York, 1938. $3.50.*

When the life of Dr. Jackson, Father of Bronchoscopy, was announced, there was a mild flutter of expectation over what a living scientist might have to say about the world in general, his profession in particular, and above all, himself and his lifework. Now that the literary and scientific world has had a chance to assimilate the finished product, there has been by no means the thunder of applause that might have been expected, although comments on the whole have been favorable. Founder of modern laryngology, Chevalier Jackson is one of the few living pioneers in new fields of medical practice. Perhaps the frankness of his views, his honest castigation of the practices, if not the persons, of medical stuffed shirts, his practical slants on teaching and training of assistants, are not the type which arouse enthusiastic response. Another feature of this unusual book is the number of colorful reproductions of the author's own paintings, evidence of his ambidexterity in art and science.

THE LIVING BODY, C. H. Best and N. B. Taylor, *Henry Holt and Co., New York, 1938. $3.60.*

College courses in human physiology, nursing schools, as well as dental and agricultural schools, will find this new textbook on human physiology well worth careful investigation. Emanating as it does from the University of Toronto, it gives every evidence of the high scholarship of its authors, their practical teaching experience, and their appreciation of student needs. Even as a reference work for teachers of physiology and hygiene, as well as a library book for those well-informed enough to understand it, it merits thoughtful attention. The book lacks both a glossary and a bibliography, but for those classes where the didactic rather than experimental methods are to be used perhaps this omission is just as well.

MANUAL FOR COMPARATIVE ANATOMY, Leonard P. Sayles, *The Macmillan Co., New York, 1938. $1.60.*

This laboratory manual is based on the use of the more or less traditional types for comparative study, amphioxus, spiny dogfish, necturus, turtle, pigeon and cat. Each organ system is studied separately, after an introductory series of drawings of the main chordate types. This brings together under each heading all various developments of the type forms from the viewpoint of the integumentary system, the skeletal system, the muscular system, the digestive and respiratory systems, circulation, the urogenital system, sense organs, and the nervous system.

A MANUAL FOR THE BIOLOGY LABORATORY, P. D. STRAUSBAUGH AND B. R. WEIMER, *John Wiley & Sons, Inc., New York, 1938. $1.75.*

This laboratory manual and guide is designed to accompany the textbook recently put out by the authors. It embodies much of the new techniques in teaching, the use of partially predrawn illustrations, the detachable laboratory drawing sheets,—all of which should give the student more time to spend on his identification of parts and less required on detailed drawing.

THE MICROTOMIST'S VADE-MECUM, EDITED BY J. BRONTE GATENBY AND THEOPHILUS S. PAINTER, *P. Blakiston's Son & Co., Inc., Philadelphia, 1937. $9.00*

"Lee's Vade Mecum" is internationally known as the outstanding work on histological technique. For a long time it was confined to the methods of European, particularly British, authors. In later editions American discoveries in the field were gradually added. This latest and tenth edition includes an entire third section on botanical methods employed throughout the scientific world, thus making it the most cosmopolitan single-volume reference work in the field. No library or histological laboratory can esteem itself complete if it lacks this outstanding manual.

THE NATION'S FORESTS, WILLIAM ATHERTON DU PUY, *The Macmillan Co., New York, 1938. $3.00.*

Every once in a blue moon there appears a new book on an old subject which, in the plethora of similar treatises, runs the risk of being passed up as "just another book on this or that." Such an invaluable treatise is this Du Puy book which deserves the widest possible recognition. It is not that it is so scientific, either in matter or treatment. It is not that it is so astonishing, either in its revelations or its literary style. All of these are conspicuous by their unobtrusiveness. What makes this an outstanding contribution to our forestry literature is its honest simplicity and its intelligent logic. This reviewer defies all but the most hardboiled and narrow specialists to lay this book down unconvinced. It ought to be in every university, college, high school and grade school, as well as every private library in these United States. If that be scientific treason, make the most of it. There will be many a conservationist who will back it up.

NEW CREATIONS IN HUMAN BEINGS, LOUIS BERMAN, *Doubleday, Doran & Co., New York, 1938. $3.00.*

A student of the internal secretions, the author of this much discussed work runs rampant over the possibilities of controlling mental defectives, criminals, insane and neurotic patients. Whether the facts will bear out the authors prophecies and advice remains to be seen.

NEW ENGLAND NATURALIST; CLINTON V. MCCOY, EDITOR*; New England Museum of Natural History, 234 Berkeley St., Boston, Vol. I, No. 1, Dec. 1938. $ .90 yearly.*

This new magazine of the New England Museum of Natural History succeeds the previously published "Bulletin." It aims to be entertaining, instructive and authoritative. It is well-written, well-illustrated, and covers a wide range of fields, from wild bee hunting to gemmology. The magazine deserves support everywhere, but most enthusiastically of all, in its native New England.

NOTES OF A NATURALIST, CLARENCE HAWKES, *Christopher Publishing House, Boston, 1938. $1.25*

Through the year with a naturalist, one Clarence Hawkes, who seems to be a delightfully poetic and philosophical gentleman, and a watchful student of nature and living things.

ON MIASMATA AND CONTAGIA, JACOB HENLE, *The Johns Hopkins Press, Baltimore, 1938. $1.00.*

The John Hopkins Press has been conferring a distinct favor on American, and all English-speaking science for that matter, in republishing epoch-making scientific papers. Such is this present, and latest, offering, Jacob Henle's "On Miasmata and Contagia." The translation is by Dr. George Rosen. Such works are of more than historical interest, their propagation and preservation in a useful form is a scientific labor of love which deserves encouragement.

OUR FERNS, Willard N. Clute, *Frederick A. Stokes Co., New York, 1938. $4.00.*

First issued in 1901, this informative manual by the founder of the American Fern Society, and the American Botanist, now makes its appearance in a second edition. Most of the interesting characteristics of its predecessor are retained, and several new features have been added. Among the latter are the really extensive collection of illustrations, not only of fern structures and habit, but also of habitats, not a few of which are in color. In view of the author's position in the world of fern lovers and students, this book merited reissue as one of our classical contributions to American botany.

PARASITOLOGY, R. Hegner, F. Root, D. Augustine and C. Huff, *D. Appleton-Century Co., New York, 1938. $7.00.*

This new work is considerably more than a revision of "Animal Parasitology" which made its bow to the biological world some nine years ago. Designed originally for teachers and students of parasitology, for practising physicians and veterinarians, this completely modernized version will make the book much more valuable to its users. The fifty-three chapters of the book have been divided into three main sections, of which Dr. Hegner assumes responsibility for the protozoon parasites, Dr. Augustine for the helminth parasites, and Dr. Huff who has revised the late Dr. Root's section, for the parasitizing arthopods. The book is an essential element for the well-balanced library.

PATHOLOGICAL TECHNIQUE, Frank B. Mallory, *W. B. Saunders Co., Philadelphia, 1938. $4.50.*

The rapid development of pathological techniques in recent years demanded someone's assuming the responsibility of weighing and sifting the various methods now in use with an eclectic mind. Dr. Mallory, consulting pathologist to the Boston City Hospital, has done this, and unless your reviewer is very much mistaken, has done it well. Less than 500 pages in length, this manual is compact enough for handy usage, yet complete enough to form an entirely satisfactory text for most histological courses where students make their own preparations. The scope of the work can best be realized from the general division of its nineteen chapters into three parts, the first of which deals with the more or less well-known general materials and histological methods. The second part discusses more at length special histological methods. The third part is entirely devoted to autopsy methods and techniques.

PATTERNS OF SURVIVAL, John H. Bradley, *The Macmillan Co., New York, 1938. $2.25.*

This is a rather difficult book to place, dealing as it does with the various philosophical implications of scientific facts and theories. The author is Professor of Paleontology at the University of Southern California. As magazine article various parts of this book have appeared in such leading magazines as the Yale Review, Harper's, Forum, The American Scholar and Mercury. Their importance as literary contributions to our scientific philosophy thus attested, the book's importance cannot be underestimated. As the philosophy of one of our leading scientists, the purpose of the book is most aptly summed up in the closing lines of the introductory chapter: "If there is any meaning for mice or men in the restless drive of life, a billion years of living should contain it. To search those years for that meaning will be the object of this book."

THE PEYOTE CULT, Weston La Barre, *Yale University Press, New Haven, 1938. $2.50.*

The nineteenth study in the remarkably interesting series which comprises the "Yale University Publications in Anthropology," this new work should attract the attention of all anthropologists who are interested in early Amerind religious beliefs and practises. If works like this did no more than preserve for future study and reference the early prehistoric traditions of our land, they would be scientifically important. That the cult still lives is added justification for these important studies.

THE PHYSIOLOGY OF PLANTS, William Seifritz, *John Wiley & Sons, Inc., New York, 1938. $3.50.*

Those who have known the research work of William Seifritz over the past ten years and his extensive manual on protoplasm, will be glad to know that he has turned a facile, and expert hand withal, to the preparation of an undergraduate text in the physiology of plants. To see the book is to want to read it over carefully, to read it so is to want to own it. Somewhere in the book, the author sets down his three-fold aim in its preparation,—to avoid finality in statement, to emphasize the relationship between plant physiology and common experience, and to be as fluent and readable as is consistent with scientific accuracy. That he has succeeded in all three, and more, we think the reception given this book will prove. It deserves attention.

PLANT PHYSIOLOGY, Nicolai A. Maximov, *McGraw-Hill Book Co., Inc., New York, 1938. $4.50.*

This second edition of Professor Maximov's original work which appeared in 1930 in this country, is a revised translation of the fifth Russian edition. The editors, R. B. Harvey and A. E. Murneek have not slavishly followed the translation from the Russian original, but have introduced their own ideas on many subjects, considerably augmenting and amplifying the original. References have been kept, as far as possible, in the field of English writing. This newly revised edition of a new Russian edition should establish and extend the number of schools using this textbook.

PRACTICAL ANATOMY OF THE RABBIT, B. A. Bensley, *P. Blakiston's Son & Co., Inc., Philadelphia, 1938. $3.00.*

This sixth edition of a well-known and much used text has been extensively revised by Dr. Craigie of the University of Toronto at the request of the late Dr. Bensley's heirs. As a result there has been considerable simplification of more or less difficult passages in the older work. This process results in a more precise, more accurate, and more up to date book.

PRACTICAL MICROBIOLOGY AND PUBLIC HEALTH, William B. Sharp, *C. V. Mosby Co., St. Louis, 1938. $4.50.*

Bacteriologies for medical students are common enough. It is comparatively rare that one comes across a text that is primarily for public health students, as well as for the general bacteriology and pre-medical tyros. This book has a distinctly different method of approach. The student is expected to have familiarized himself with his own or other standard texts, he is supposed to have listened to and absorbed the material presented in lectures. Following these he is supposed to fill in the unsupplied data for which space has been left in this manual. Thereby he writes his own textbook.

READINGS IN ELEMENTARY ORGANIC CHEMISTRY, L. A. Goldblatt, *D. Appleton-Century Co., New York, 1938. $1.25.*

Here are some nineteen outstanding announcements of major advances in the field of organic chemistry. These are photostated from their original publication, and parallel translations are furnished for the foreign language articles. Most of the articles have appeared in the last few years although there are some which date back to the earlier years of the nineteenth century. The idea behind such a project as this is not without considerable merit. The student who picks up this work is being thrown in with replicas of some of the most outstanding original announcements in his field. His interest once aroused, he probably will wish to go further and consult more of the original books, pamphlets, and serials in which these and similar original research reports first made their appearance.

THE REPTILES OF OHIO, Roger Conant, *The University Press, Notre Dame, Ind., 1938. $2.00.*

This is another monograph restrict-ed to a single group from a single locality. To all intents and purposes it would seem to cover the entire field very acceptably. There is a helpful discussion of the geography and physiography of the state. Throughout the work this idea is elaborated in half-page key maps of Ohio; accompanied by thumb-nail sketches of the United States. The state maps give visual locality records, the government maps give the general range of the individual forms. There are twenty-three pages of really excellent photographs of the various species and their habitats. Useful advice in case of snake-bite is included as well as an extensive bibliography. This book review section has always maintained that we cannot have too many regional studies well planned, well executed, well written, well documented,—all of which will warrant their being well received.

ROOTS, Vernon Quinn, *Frederick A. Stokes, New York, 1938. $2.00.*

This is the third of a series of works dealing with various parts of plants. The leaves and seeds having been previously treated, this volume is devoted to the history, literature and legend of roots. Where so much ancient literature, fable and superstition is to be found, is a mystery to your reviewer. Of course we are all familiar with the herbals of mediaeval botany, but that so much referring to roots has been in print for so long is surprising. Those who like to browse in ancient fields as a diversion from their modern science, will be delighted with this work.

SCIENCE IN GENERAL EDUCATION, Commission on Secondary School Curriculum, *D. Appleton-Century Co., New York, 1938. $3.00.*

Students in the biological sciences should all be required to read this book. Whether they are preparing for secondary or college teaching or not, they will inevitably be forced by reason of their positions as leaders in our common intellectual life to put their convictions and ideas before others. The techniques of teaching are many and varied, but the basic idea can hardly be ignored, that every college educated person is by his very intellectual endownment responsible to his fellow man for the general uplifting of our common standards of living and thinking. How best to do it, is the burden of all teaching. Which are the best teaching methods will always be an open question, but which are the most commonly used at a given time, and most successful, is not. For this reason students of any phase of advanced biology should study this indispensible work.

SNARES, DEADFALLS AND OTHER TRAPS OF THE NORTHERN ALGONQUIANS AND NORTHERN ATHAPASKANS, John M. Cooper, *The Catholic University of America, Washington, 1938. $2.00*

The collection of data relating to the ancient customs, traditions and beliefs of prehistoric America is one of the functions of our anthropological study in this country. From the results of these studies comparative estimates can be drawn as to the stages of culture attained by various Indian tribal groups. There is, however, a still more important possibility in all this work, and that is the correlation of the data so obtained with the findings of other anthropologists in similar life habits among the peoples inhabiting other, and possible once connected continents. Dr. Cooper's work is of importance for both reasons. It is of special interest when one considers the possibility of tracing the advent of the prehistoric peoples of the Americas from Asia by way of the Bering Straits and the Aleutian archipelago. Like all of Dr. Cooper's work, this paper is painstakingly exact, and well documented.

THE SOCIAL LIFE OF ANIMALS, W. C. Allee, *W. W. Norton Co., New York, 1938. $3.00.*

Book reviewers have been almost unanimous in their praise of this new and outstanding work by Dr. Allee. Ordinarily speaking this should be sufficient to put a stout, illuminated "Keep Off!" sign on it for serious biologists who have no time to waste on publicity-gaining scientists. A careful inspection of Dr. Allee's work makes us want to get up on the biology laboratory roof and shout to all such, and other misguided people: "Come on back and look this one over!" If Dr. Allee had done nothing more than to get into circulation the delicious results of his "peck-reaction" among domestic fowls, he would have deserved the Nobel Peace Prize,—which perhaps he will never receive! At the present juncture in international relations we defy anyone to read his seventh chapter on group organization without an instinctive comparison with what is going on in Europe today. Why doesn't some national figure like President Roosevelt, or Cardinal Mundelein publicly refer to "the Nazi chickenyard where the 'peck-reaction' dominates?" The results would be uproarious.

SOILLESS GROWTH OF PLANTS, CARLETON ELLIS AND MILLER W. SWANEY, *Reinhold Publishing Corporation, New York, 1938. $2.75.*

So much has been said and written about the newer methods of chemiculture as affecting crop plants, that one more book or less on the subject would probably make but little difference. This particular new work, however, merits consideration by reason of its inclusiveness. It is wedded to no particular system. Whether it be growing plants in mineral aggregates either sand or subsoil, or in water, or the question of growing flowers and vegetables for the family, or even the commercial aspects of all of these, this comparatively thin book gives adequate and practical methods of procedure. It is to be recommended to all who are interested in this type of experimentation. That it should be of particular interest to biology teachers in rural, high or graded schools goes without saying.

SOVIET SAMPLES, PERCY M. DAWSON, *Edwards Brothers, Inc., Ann Arbor, 1938. $3.60.*

As one who has sat at the feet of Dr. Percy Dawson and listened to his fascinating stories of early development in the study of animal physiology, this book has a special appeal. Formerly associate professor of physiology at the University of Wisconsin, more recently Dr. Dawson has made a trip to the U.S.S.R. and travelled pretty widely through the scientific institutions in that country. His observations are, on the whole, complimentary to the soviet way of doing things, but one may be forgiven a purely proletarian doubt as to whether the author had his tongue in his cheek as he wrote these memoirs, or not. Certainly the most altruistic American graduate student in science would balk at some of the prescriptions under which his soviet fellow-scientist must labor. It is interesting to know that the newspapers were, for once, not wrong in their statements regarding the experiments on the cross breeding of anthropoids with human females, which however proved futile.

THE STRUCTURE OF ECONOMIC PLANTS, HERMAN E. HAYWARD, *The Macmillan Co., New York, 1938. $4.90.*

This substantial volume collects into one available reference information regarding our economic plants which can be found only by access to extensive libraries. Following several chapters dealing with plant structures in general, the following forms are treated: corn, wheat, onion, hemp, beet, radish, alfalfa, pea, flax, cotton celery, sweet potato, white potato, tomato, squash and lettuce. Since these represent a fairly wide dispersion over the larger categories of plant types and most of our domesticated vegetation are closely allied with these representative forms, this should be a fairly indispensable reference work for agricultural, and botanical courses.

SUWANNEE RIVER, CECILE H. MATSCHAT, *Farrar & Rinehart, New York, 1938. $2.50.*

The publication of "Suwanee River, Strange Green Land," was a signal for a chorus of praise which neither of its two predecessors in the "Rivers of America" series evoked. One has only to dip into this fascinating book to understand why. The author has not attempted to give the whole story of the famous river of our greatest folksong. She has instead pursued her way up to the sources of the Suwannee, that mysterious realm of the Okefenokee Swamp about which so little has up to now been known. That it must be a biologist's paradise, is not hard to understand. That the serpent and others of his reptilian kind are not lacking, seems also evident. Botanists, zoologists, ecologists, and all nature lovers in general will want to read, if not to own this work.

SYNOPSIS OF PHYSIOLOGY, A. HENDLE SHORT AND C. L. G. PRATT, *William Wood & Co., Baltimore, 1938. $3.50.*

At first sight the price asked seems exorbitant for such a small pocket-sized volume, but not for long. Once one dips into it and discovers how really extensive this synopsis is, how completely it covers the physiological field, the price consideration fades out of the picture. With many of the diagrams and illustrations in color it should as amply and successfully serve its purpose as the two previous editions.

THE TEACHING OF NATURE STUDY AND THE BIOLOGICAL SCIENCES, HARRINGTON WELLS, *The Christopher Publishing House, Boston, 1936. $4.00.*

As a member of several state committees on the teaching of science in the California graded school system, the author of this work brings to it all the theory which is behind the work in nature study in the schools of his state. The book is prodigiously referenced, and its suggestions fall well into line with the progressive teaching movement. Prospective teachers should familiarize themselves with it.

A TEXTBOOK OF BACTERIOLOGY, THURMAN B. RICE, *W. B. Saunders Co., Philadelphia, 1938. $5.00.*

Indiana's Dr. Rice has the pleasant distinction of producing a textbook which in the short space of two years has been so successful that a new and revised edition is necessary. If the readers of this magazine are looking for a "practical" text and reference book, they need search no farther. The author has stripped this work of all excess intellectual and traditional baggage, with the result that it is a marvel of compact lucidity and useable practicality. It deserves the patronage it is getting.

TEXTBOOK OF COMPARATIVE PHYSIOLOGY, CHARLES G. ROGERS, *McGraw-Hill Book Co., New York, 1938. $5.50*

The second edition of Dr. Rogers eminently successful manual has been strengthened by considerable elimination and compression, and this in spite of what the author aptly terms the "perfect avalanche of new and pertinent results of research" which has occurred since the first edition appeared. That the book merits the confidence of all its former users, and deserves the attention of prospective ones goes without saying. There is a real need for a textbook which focuses attention on the physiology of animal forms from the lowest to the highest on a comparative basis.

TEXTBOOK OF DENDROLOGY, WILLIAM M. HARLOW AND ELLWOOD S. HARRAR, *McGraw-Hill Book Co., New York, 1937. $4.50.*

It needs only a superficial inspection of this textbook to realize its importance and usefullness not only for classroom and field work, but also as a reference work in the general library. We have many books about trees, and about forestry, but this is the only one which assembles within reasonable compass the salient facts about the most important tree groups from an economic or decorative angle, without going into complicated and confusing taxonomic details. As a foundation to advanced forestry the book is indispensable.

A TEXTBOOK OF GENERAL BACTERIOLOGY, EDWIN O. JORDAN, *W. B. Saunders Co., Philadelphia, 1938. $6.00.*

This twelfth edition of one of America's best and most favorably known bacteriological textbooks comes from the careful hands of Dr. William Burrows, of the University of Chicago, who has carefully preserved the last edition almost intact, adding but little to materially change it. Most of the more recent references are to be found in the newer phases of bacteriological research, chiefly economic and commercial.

A TEXTBOOK OF GENERAL BOTANY, RICHARD M. HOLMAN AND WILFRED W. ROBBINS, *John Wiley & Sons, Inc., New York, 1938. $4.00.*

Although the third edition of this standard and highly esteemed text appeared only in 1934, a new and thoroughly revised fourth edition makes its appearance this year. Information on root absorption and conduction has changed so materially in recent years, as also the results of research on sap-rise and conduction of foods. These have all been brought up to date. The description of leaf origins and tissue classification has been revamped, and a glossary giving not only definitions but also word-origins has been added. With these added improvements, those who have found the textbook useful in the past, and others who are looking for this sort of improved manual will be glad to investigate its added values.

A TEXTBOOK OF GENERAL PHYSIOLOGY, Philip H. Mitchell, *McGraw Hill Book Co., New York, 1938. $6.00.*

Dr. Mitchell's favorably known and popular physiology text has gone almost complete revision in this third edition with the purpose in mind of bringing each subject of discussion into harmony with the latest research on the subject. The author has a genius for organizing his material, and a clarity of presentation which leaves little to be desired. Whether for classroom or for reference use, his contribution to our library shelves is most acceptable, not only for what it contains but for the intelligence displayed in the selection of his material. The chapters on physical and biochemistry are so badly needed by the species of student whose physical and chemical training is such a hodge-podge of misinformation, half-remembered facts, and loop-holes of ignorance.

TEXTBOOK OF GENERAL ZOOLOGY, Winterton C. Curtis and Mary J. Guthrie, *John Wiley & Sons, Inc., New York, 1938. $3.75.*

This has been a year for textbook revisions especially in the field of biology. Large numbers of our standard and better-known texts are being reedited to bring them more into line with the changing currents of recent zoological research. The well and popularly known Curtis and Guthrie zoological text has come in for its share of these changes. The first six chapters are now devoted to general considerations more or less fundamental to a knowledge of zoology,—organ systems, irritability, cell theory, reproduction and heredity. Then follows a more compressed survey of the animal kingdom from the protozoa to the mammals. This brings the text more into line with a practise which is very common in botanical textbooks, giving first the basic principles of structure and function, following these up by a survey of the phyla.

A TEXTBOOK OF HISTOLOGY, Alexander A. Maximow and William Bloom, *W. B. Saunders Co., Philadelphia, 1938. $7.00.*

This completely revised third edition of the Maximow-Bloom text has been brought up to date as a result of the newer developments in the histological fields, particularly in histophysiology and pathology. The book therefore will be all the more welcome to those who have to teach, study or make a life-work out of pathological techniques.

TREE GROWTH, Daniel T. MacDougal, *Chronica Botanica Co., Leiden, Holland, and G. E. Stechert, New York, 1938. Guilders 7, or about $4.00.*

Evidently the Chronica Botanica Company is not going to restrict its services to the publication of its bimonthly journal of botanists and botanical news. Franz Verdoorn has assumed the editorship of a new series of plant science books of which this is the first,—and most commendable,—example. The first few chapters are devoted to certain general observations about the growth of trees, its measurement, inception, and seasonal activity. Then follow the results of particular research on certain type species,—the pines, certain other gymnosperms including the Sequoias, the elms, maples, beeches, oaks and several other angiosperms. The book closes with a group of chapters correlating cambial root and trunk cambium, leaf-surface area and extent of wood-formation, and experimental modifications of wood formation. This is a book no forestry library can do without.

TREES, John Y. Beaty, *M. A. Donahue & Co., Chicago, 1938. $1.50.*

The former associate of Luther Burbank has given the youth of this country, particularly the boys, a gorgeous introduction to our American forests. Ten chapters in story form tell the adventures of two youngsters, and a girl, with a wise and interested oldster, who leads them through the year discussing the ways of the trees, and Mother Nature with them. The book is thin, but with 10 by 12 inch pages, it manages to crowd in a surprising amount of botanical and forest information, all of which is clearly illustrated by the large number of attractive photographic illustrations. For the young Scout, the inquiring grade school lad, or for the library shelves, this book is a decidedly welcome acquisition.

TURTOX TEACHERS, MANUAL AND BIOLOGY CATALOG, *General Biological Supply House, 761 East 69th Place, Chicago, Ill. 1938.*

There are a few of our American supply houses who go out of their way to publish really helpful catalogs. Whether the teacher wishes to purchase or not, this book is worth having for reference, and general information.

THE UNDERWATER ZOO, THEODORE McCLINTOCK, *The Vanguard Press, New York, 1938. $1.75.*

From April 26th to Sept. 5th the author of this attractively informing little book kept an aquarium of swamp water, and describes the events that went on there. Among the denizens of most ponds, ditches, and small streams there are many types which the average fish fancier never dreams of. Between the average gold-fish bowl, or even the aquarium of tropicals, and a tankful of the wilder water forms, there is about as much difference as between a pillowful of tabby cats and a cage of tigers. This would be a good book for a school library, as it gives full directions for preparing and maintaining such an aquarium.

THE UNVANISHING NAVAJOS, BELLE S. SULLIVAN, *Dorrance and Co., Philadelphia, 1938. $2.50.*

Every lover of our great Southwest as well as every anthropologist will be interested in this enthusiastic bit of pro-Navajo propaganda. The book does not profess to be scientific, yet it boasts a bibliography of popular but intelligent references on the subject. The book is well planned and illustrated. It should help to bring our American people to an appreciation for the priceless heritage we all share in the remaining really native American racial groups.

VIKINGS OF THE SUNRISE, PETER H. BUCK, *Frederick A. Stokes Co., New York, 1938. $3.50.*

People who were fascinated by the earlier Nordoff and Hall semi-historical cycle of stories dealing with Pitcairn Island, and all those who enjoyed their more recent story, and the dramatization of it under the title "Hurricane," will want to get a background for the romance of the South Sea Islands as authentic as that supplied by Dr. Peter Buck, half Irish and half Polynesian ethnologist. Educated as a physician, Dr. Buck transferred his interests to the ethnological work of the world famous Bishop Museum in Hawaii, and set out to help preserve for posterity the history, traditions and beliefs of the Polynesian peoples. This more popular and less scientific summary of his experiences among the myriad islands of Polynesia, is fascinating, as fascinating as his title is suggestive of the dawn facing and worshipping people whose story he tells. That he has reincarnated the last remnants of one of the world's stone ages is fortunate for science.

VITAMIN B_1 (THIAMIN) AND ITS USE IN MEDICINE, ROBERT R. WILLIAMS AND TOM D. SPIES, *The Macmillan Co., New York, 1938. $5.00.*

Even though this is a medical work, general biologists cannot afford to remain ignorant of the most recent advances in the field of the vitamins. Thiamin was first isolated in quantities sufficient for experimental use by the senior author of this book in 1934, as the result of research aiming to combat beriberi. This book is divided into two main sections, the first dealing with the use of thiamin in the practice of medicine. The second part treats of the history of the vitamins, the discovery of thiamin, and the results of experiments with it since its isolation. As a reference work for the up-to-the-minute physician, the dietician, and the biologist, it should prove valuable.

THE WEST AMERICAN CENOZOIC ECHINOIDEA, U. S. GRANT IV, AND LEO GEORGE HERTLEIN. *University of California Press, Berkeley, 1938. $3.00.*

Paleontologists and students of evolution should be interested in this publication as it covers the whole phylum of the echinoids during the cenozoic. The treatment is systematic throughout, there are several good illustrations, and copious references printed as footnotes to each page.

WILD BIRDS IN BRITAIN, SETON GORDON, *Charles Scribner's Sons, New York, 1938. $3.50.*

The average untravelled American biologist will look at the heading of this review and sniff, more or less disdainfully, "well, who cares about the wild birds of England, at least on this side of the water?" If on the other hand, especially if he belongs to the tribe of Nimrod, he were to run across this book on a bookstore counter and just turned over a few of its pages, he would presently manifest all the symptoms of acquisitiveness,—at least until he bought the book. There are some hundred excellently done photographic studies of bird habits and habitats, and two colored illustrations. The author is no pedantic systematist, but rather a chatty sort of a bird lover who does not grow lyrical about his subjects, but just decently enthusiastic. Which is about all anyone could expect from a biologist.

WILD FLOWERS OF OHIO, HAROLD L. MADISON, *The Cleveland Museum of Natural History, Cleveland, Ohio, 1938. $1.50.*

Were it not for the very small illustrations of the various plant forms, this new field manual of the wild flowers of Ohio would be about as handy and serviceable a pocket field manual as could be found in any state in the Union. The 190-page book lists and figures 825 plant forms, arranged in the usual fashion by families, each page of text facing another on which are twelve habit-sketches. The binding is a serviceable dark green fabrikoid, and the convenient size easily permits its being tucked in the hip-pocket, or the pack sack. At the reasonable price asked, this manual should be within the reach of every botany student in the Middle Western state of the Ohio region.

YOU AND HEREDITY, AMRAM SCHEINFELD, *Frederick A. Stokes Co., New York, 1939. $3.75.*

At last the popular book to end all popular books on heredity has made its appearance! While this review is being written before the Christmas holidays, we shall be very much surprised if, by the time of its release, it does not rate at least one "Book of the Month" clubs choice. By all odds it is the best new work on the subject. First of all, it is scientifically reliable,—too many trustworthy scientists had a hand in its coming into being. Secondly, it is engagingly written,—so much so that it could be awarded a high "A" for super-intelligently satisfying science-publicity. Thirdly, it completely and adequately covers the subject,—which is saying a lot for a popular work. Fourthly, it is effectively illustrated,—the scientific photographs, medically interesting perhaps, are reduced to a minimum, and plenty of colored and black-and-white cartoon sketches enliven the pages. Finally, and most important, it is devastating in its disruption of many of our genetic, and eugentic, shibboleths, as for instance the beloved-of-sociologists Jukes and Kallikaks.

THE YORUBA HUSBAND-WIFE CODE, EDWARD WARD, *The Catholic University of America, Washington, D. C., 1938. $1.75.*

The Anthropological Department of the Catholic University of America has hit upon a novel yet singularly effective method of developing its research program, and ethnological resources. This is to enlist the vast army of Catholic missionaries in foreign and domestic fields, to make them anthropologically minded, and to train selected men from the various missions, or missionary groups, in the compiling and accumulating data from the various fields in which they labor. The results are beginning even now to pour in. The present volume is one such piece of work. It deals with a Negro people dwelling in southwestern Nigeria, along the shores of the Bight of Benin. Anthropologists interested in African folk cultures will want to own this 175 page document.

ZACA VENTURE, William Beebe, *Harcourt Brace & Co., New York, 1938. $3.00.*

Of each new William Beebe book it is easy to paraphrase the popular reviewer who said that there is nothing quite so well worth reading better than a William Beebe book than another William Beebe book. However the gag may go, the fact remains. When we had gotten to think that Mr. Beebe had explored just about every little known out-of-the-beaten-path spot in this hemisphere, he pops up with another fascinating tale of new and strangely unvisited places. This time it is the peninsula of Lower California, and the Gulf of California. There is no need to go into details about the book here. Those who know William Beebe's ability to organize exploring trips, and his extraordinary facility in describing his experiences will want to find it all out for themselves.

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